AUTOMOTIVE INDUSTRIES

JUNE 1, 1949

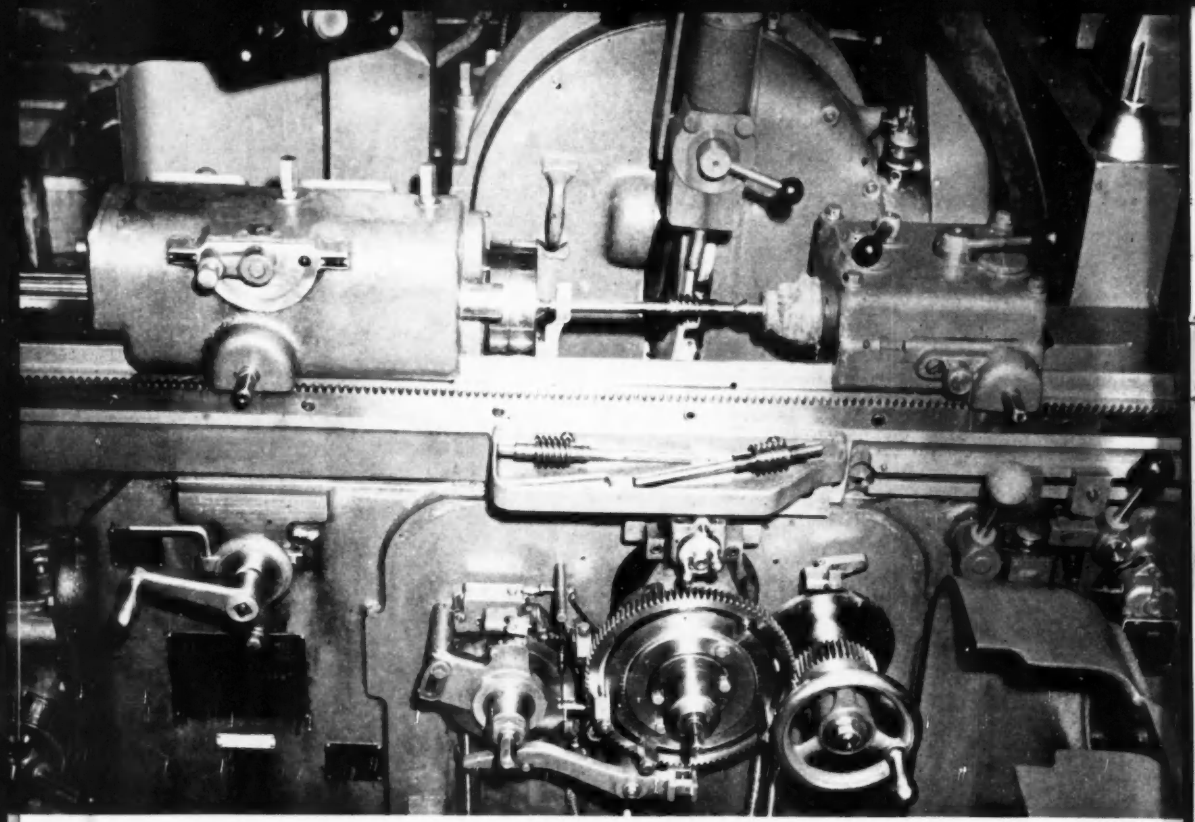


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A CHILTON PUBLICATION



Turns tables on worm-grinding trouble...

OPERATION: Grinding

PART: Triple-lead worm gear

MATERIAL: SAE 4140 heat-treated steel of 46-50 Rockwell C hardness

MACHINE: Jones & Lamson Thread Grinder

BURNING OF GEAR SURFACES, on the grinding operation described above, troubled the Acme Gear Company, of Milwaukee, Wisconsin. The company began a search for a cutting oil that would prevent such burning.

Various cutting oils were tried. Of these, one product not only stopped burning troubles but brought great all-around improvement. The product: Superla Thread Grinding Oil A. The results: grinding speed increased 20%, production boosted to 10 pieces per hour, finish held to between 14 and 20 microinches.

Superla Thread Grinding Oil

Results—like those above—have shown, again and again, that Standard Oil's cutting oils and coolants reduce machining costs to a minimum, raise product quality to a maximum. That's why you can count on those benefits for your operations. A Standard Oil Cutting Oil Engineer will help you obtain them.

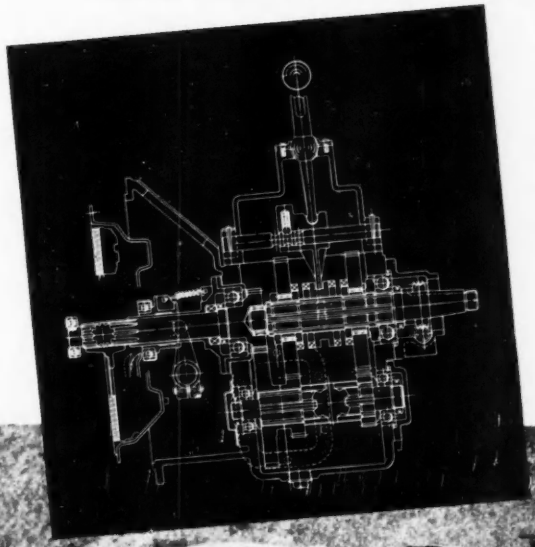
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Contents

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THE FORMING OF CURVED SECTIONS AND TUBING

FORMING OF CONTOURED-FLANGED PARTS

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DOUBLE-ACTION DIE FORMING OF DEEP- AND SHALLOW-RECESSED PARTS

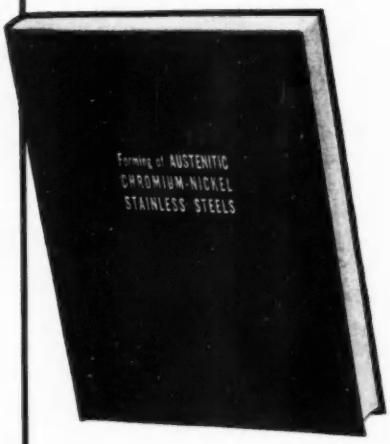
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AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

June 1, 1949 Vol. 100, No. 11

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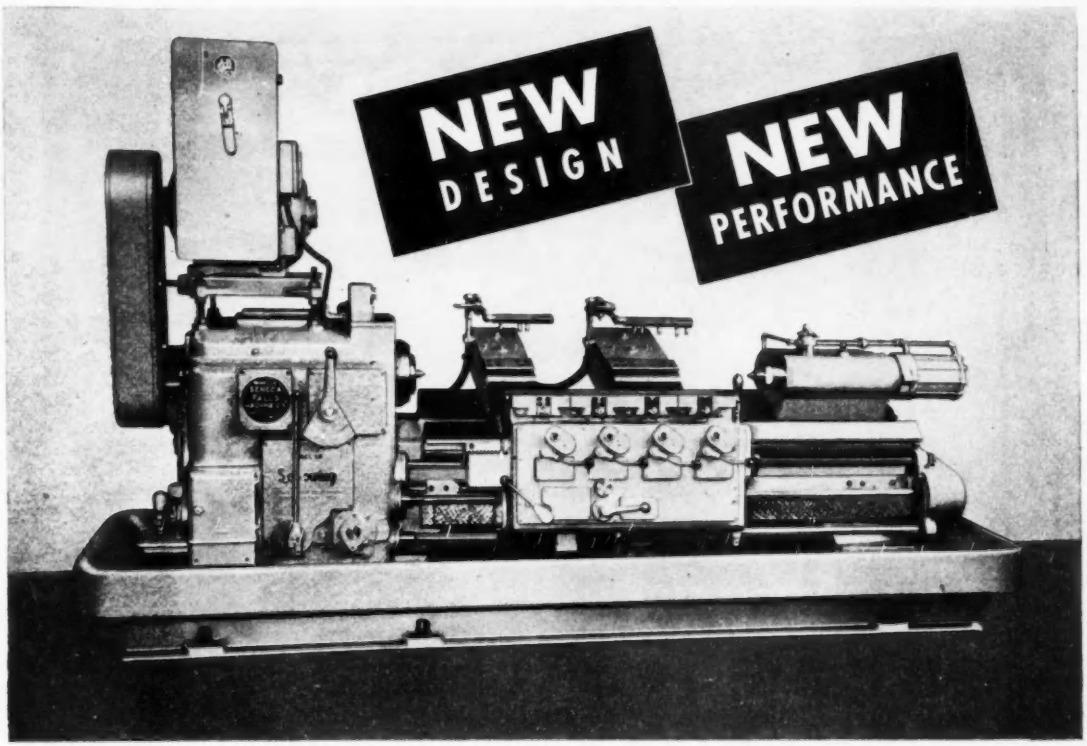
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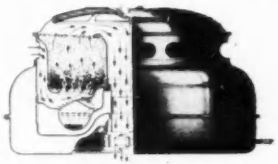
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3 way Service



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Air entering the Hudson engine is over 99 percent pure — free of harmful abrasives — thanks to the United Oil Bath Air Cleaner. The thorough dirt-trapping action of a United cleaner means less wear to rings, sleeves, pistons, bearings — insures longer engine life, better performance.



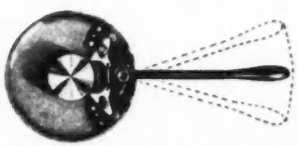
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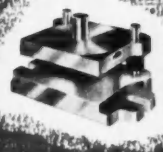
Mitchell Ignition Switch. Patented construction insures low contact resistance. All insulation is bakelite and there are no riveted joints in current carrying parts.

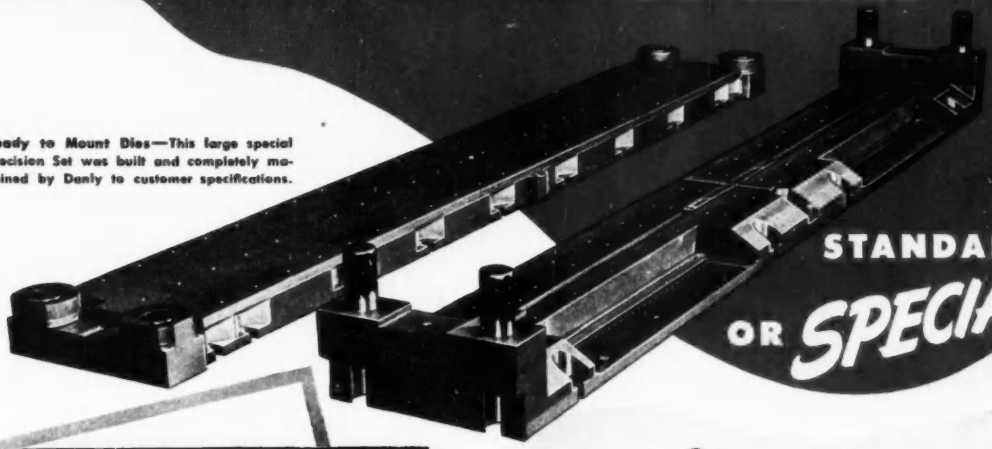
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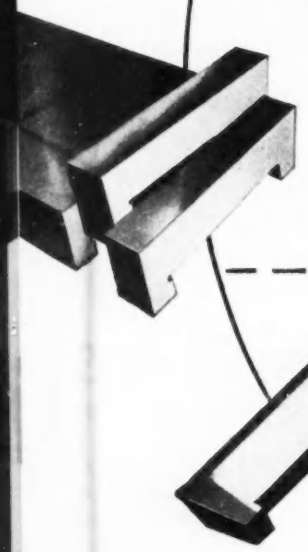




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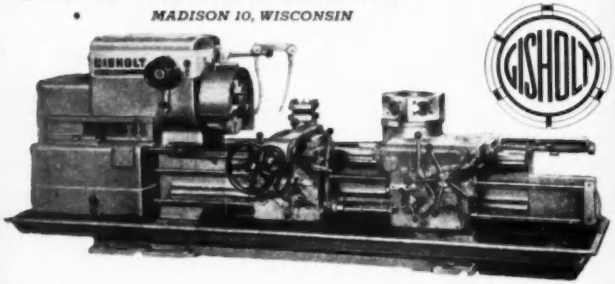
made it into a tool bit . . .

and cut metal with it!

Here it is, turning a shaft of 1045 cold rolled steel. This illustrates how precision is "hardened" into Gisholt Turret Lathes with all working surfaces hardened to 64-66 Rockwell C on ways, gibs and clamps. This extreme hardness makes Gisholt ways practically wearproof—insures lifelong accuracy—the kind of accuracy you want specified in your next turret lathe.

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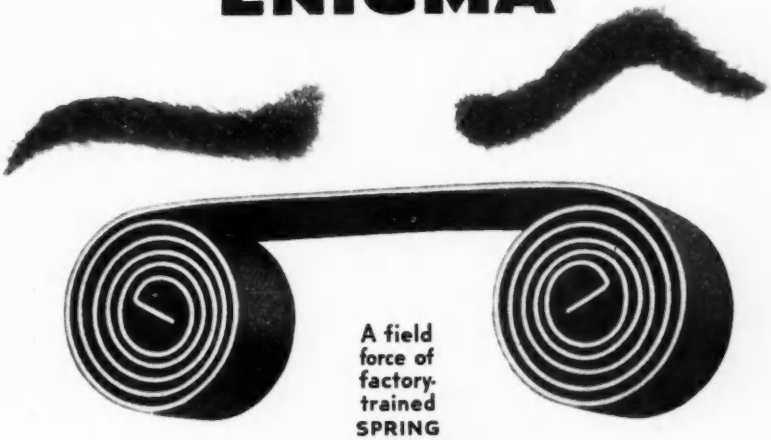
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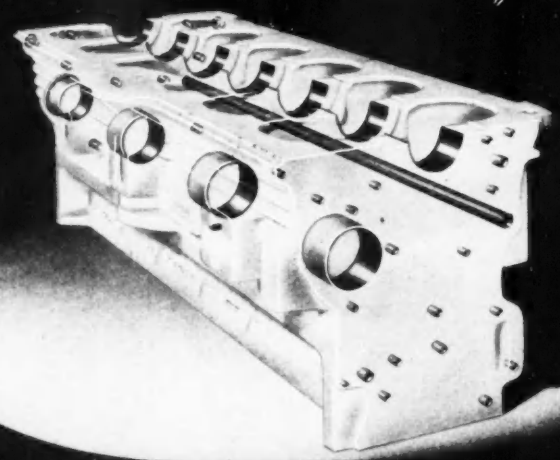
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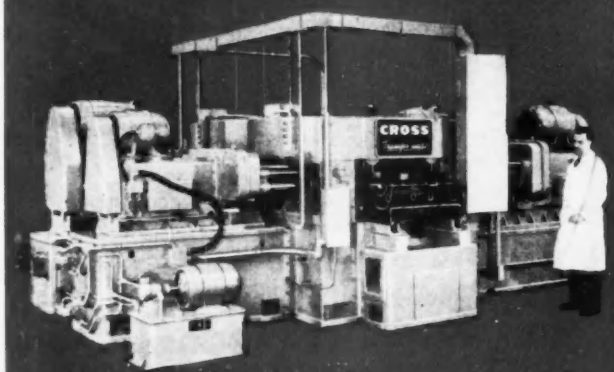
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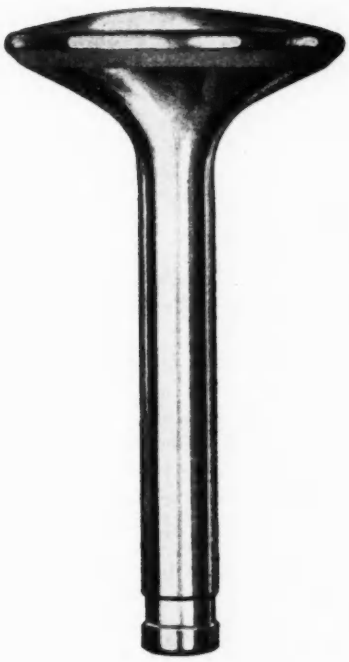
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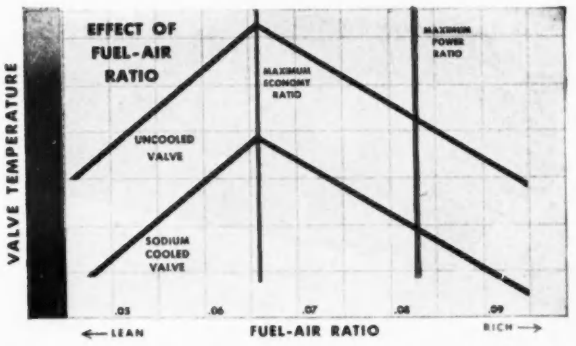
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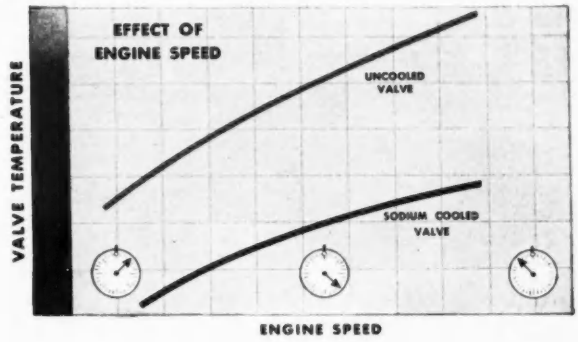
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The curve "Effect of Fuel-Air Ratio" shows that as the mixture is leaned out to obtain maximum economy, valve temperatures rise. The curve showing "Effect of Engine Speed" indicates that temperature rises quite rapidly as speed increases.







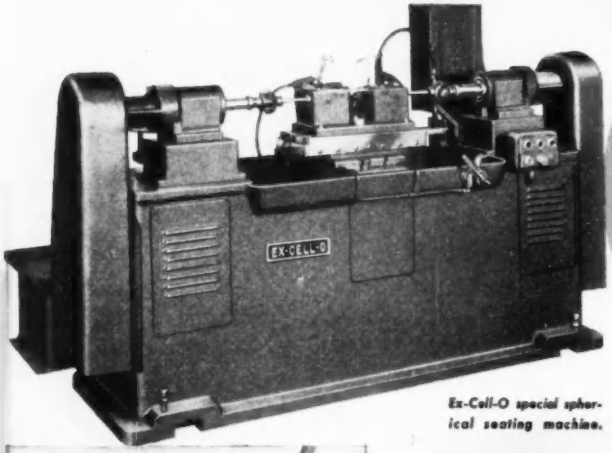
EATON
MANUFACTURING COMPANY
General Offices: CLEVELAND, OHIO

Eaton engineers will welcome an opportunity to discuss the application of Eaton sodium cooled valves to engines proposed or now in design.

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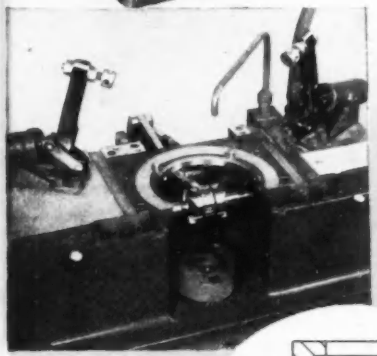
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Ex-Cell-O special spherical seating machine.

SEE EX-CELL-O

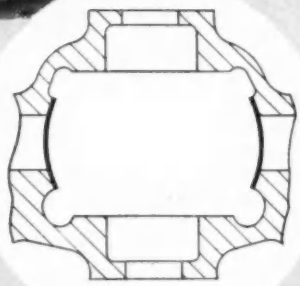


Left: View of work fixture and cutter on Ex-Cell-O special spherical seating machine.

Ex-Cell-O Machine Eliminates Slow Hand Operation on Difficult Job!

Cutting spherical seats inside automotive differential cases is ordinarily a slow hand operation that is out of place in today's production procedure. An operator working on a drill press loads and clamps the part, runs the tool holder into the work, engages the cutter, then cuts the first seat. This cut completed, he withdraws the tool holder and removes the tool. Then he unloads and reloads or indexes the part and repeats the process for the other seat . . . On the Ex-Cell-O special machine shown here the operator merely loads the part, shifts a valve that controls the clamps and presses a start cycle button. At the completion of the cycle he removes the part . . . that's all the operator does. The machine does the rest!

Right: Heavy lines show operation performed on differential cases with Ex-Cell-O special machine.



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If you have a machining problem, see your nearest Ex-Cell-O representative.

49-27

EX-CELL-O CORPORATION DETROIT 32 MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS
DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

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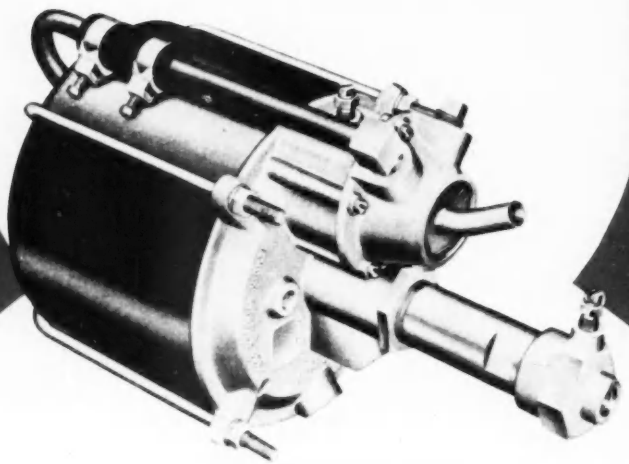
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2 MILLION INSTALLATIONS...



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the Undisputed Leader in Power Braking!

By the clear logic of numbers, two million Bendix Hydrovac* installations lead to certain obvious conclusions: first, that a definite need for power braking is now widely recognized by truck users and manufacturers, and second, that Hydrovac is the power brake most of them prefer. There is much to support the conclusion, therefore, that Hydrovac power braking might very profitably be included in the original equipment specifications of most truck manufacturers.

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*REG. U. S. PAT. OFF.

AUTOMOTIVE INDUSTRIES

The Authoritative Technical and News Magazine That Gives Comprehensive Coverage, Domestic and Foreign, of These Industries:

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Truck	Body	Accessory
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AUTOMOTIVE INDUSTRIES
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High Spots of This Issue

Air Power in France—Paris Show

Demonstrating progress made since V-E Day, France's 1949 Paris Aviation Show featured an open-air display at Esplanada des Invalides, 300 exhibits in the Grand Palais, and actual demonstrations at Orly Airfield. At this international show, 18th over a period of 40 years, American planes showed in particularly strong position. Special European Correspondent W. F. Bradley's coverage of the event is published on page 24.

Growing Applications of Automotive Diesel Engines

Estimates indicate that application of Diesel engines for trucks and buses accounts for only 12 per cent of total Diesel horsepower in the 500 hp range. The rest in this range—88 per cent—goes into marine, tractor, and various industrial uses. This informative article gives tables and charts with facts and figures on Diesel production, distribution, and application. Page 28.

First Hydrocol Plant for Synthetic Gasoline

Expected to produce 7500 bbl a day of synthetic gasoline and Diesel oil, the first Hydrocol process plant for making gasoline from natural gas nears completion at Brownsville, Texas. How this process could conceivably add 25 per cent to the motor fuel of America makes timely reading, page 33.

Fuel Spray Nozzles for Aircraft Gas Turbines—Part II

Part II discusses characteristics of variable orifice and air atomizing nozzles, and presents conclusions reached by the two authors concerning nozzle development. It follows Part I published in the May 15 issue of AUTOMOTIVE INDUSTRIES, and starts on page 36.

Industrial Plants Available for War Production

The Government has on tap some $2.3 billion worth of industrial plants and facilities it could call back into war production—should emergency industrial mobilization be required tomorrow. Appearing also in this article is the March, 1949, Munitions Board list showing the status of these selected facilities comprising our very important National Industrial Plant Reserve. For full facts turn to page 40.

26 New Product Items And Other High Spots, Such As:

Introduction of 61 heavy-duty models by GMC; compact paint shop facilities for finishing Jeep bodies at Willys-Overland; reducing truck weight with high-strength steel; the Lea-Francis midget racing engine for U. S. competition; and a current passenger car price, weight, and body table.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

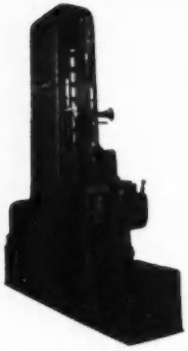


Part Name	Pawl
Material	SAE 1245 Steel
Operation	Broach side, bevel and end
Depth of Cut	1/16" max.
Production	1120 per hour
Machine	CINCINNATI No. 1-30 Single Ram Vertical Hydro-Broach tooled up for production

Heavy black line indicates broached surface

SMALL HYDRO-BROACH DOES A BIG PRODUCTION JOB

... broaches over 1100 parts per hour



CINCINNATI Single Ram Vertical Hydro-Broach Machine. Complete specifications are contained in catalog M-1389-2. Write for a copy.

Ingenious tooling can make a moderately producing machine look like a streak of lightning. And costs tumble when the "lightning" strikes. Cincinnati Application Engineers, specialists in developing low cost broaching techniques, again show how this can be done. ¶ Starting with a CINCINNATI No. 1-30 Single Ram Hydro-Broach, they tooled it up with a three-section arrangement of broach inserts and a fixture which holds a stack of five parts.

Supplying these parts to the operator in stacks of five, he can readily maintain a production rate of over 1100 per hour. The drawing at the top of page indicates the broached surfaces.

CINCINNATI Hydro-Broach Machines, completely tooled up and ready for production, have reduced costs of hundreds of surface broaching and related operations, including unusual jobs such as cutting off, internally broaching 250° arcs, and others. These machines and Cincinnati Application Engineers can do just as much for you in paring costs. Send blueprints of parts, with complete data, to the address below.

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CINCINNATI

NEWS *of the* AUTOMOTIVE INDUSTRIES

Vol. 100, No. 11 **June 1, 1949**

No Major Changes for Next Year's Pontiacs

Pontiac plans no major changes in next year's models, according to Harry J. Klingler, vice-president of GM and general manager of the Pontiac Motor Div. His statement indicates that any major changes such as higher compression engines will be put off until 1951 models. Pontiac production is currently running between 1400-1500 units a day, and only the shortage of materials is keeping the division from producing the 2250 a day for which it is tooled.

Automatic Drive Adopted For 1950 Studebaker

The Studebaker Corp. has confirmed that it has contracted with Borg-Warner Corp. for a new fully automatic torque converter type transmission. Studebaker has announced that it has arranged with Borg-Warner for the tooling and production of the automatic transmission. The company said further that it could not predict when the automatic drive would become available since the supplier must undertake a major tooling program which will necessitate the procurement of special equipment. B-W announced that manufacture of the transmission will be located in the Detroit area, indicating that it will be built at the Detroit Gear Div. C. S. Davis, president, said that tooling will be started immediately with deliveries starting late this year. He added that the transmission will contain certain features for the convenience of the driver not heretofore offered to the motoring public. More detailed information will be released about the middle of this month, according to the announcement. Studebaker did not elaborate on its plans, but it is understood that the drive will be offered on the Commander series and as optional equipment at extra cost. Because of the preparatory time required, it will not be ready until 1950 models are in production.



LONG AND LOW

The latest De Soto model to be displayed, the new Custom Convertible, is mounted on a 125½ wheelbase and is powered by a 112-hp engine. This model features an electrically-operated top.

GM to Use Hydra-Matic on Buses

GMC Truck & Coach will soon be going into production of a 27-passenger bus which will use an adaptation of the Hydra-Matic transmission. The units will be furnished by the Detroit Transmission Div. of GM, and will require some modification for bus use.

Nash Delays Decision on Lower-Priced Car

Current reports in Detroit that Nash has placed some die work for a small lightweight automobile has created a flurry of interest in reviving talk of light cars. Officially, the company says nothing, but a reliable source confirms that Nash does have a small car under development, but no official decision has yet been made to go ahead with production.

Ford Now Producing New 31-35 Passenger Bus

Ford is currently getting into production of a new 31-35 passenger coach, the only department in the entire company that has been able to operate during the strike. The reason is that the local at Highland Park did not go out on strike, but with most of the work there dependent on parts from the Rouge plant, operation was forced down. However, coach production had been suspended for several months by a strike in the plant of the body supplier and a large backlog of parts was on hand. The new model is on a 182-in. wheelbase, but the same components are used as in the 27-29 passenger model. It is powered by the Ford six-cyl, 254-cu in. engine.

Oil Companies to Market Fluid for GM Drives

GM has announced a new program designed to make available a standard automatic transmission fluid to automobile owners through oil company filling stations. Previously, fluids required to service the Hydra-Matic and Dynaflow drives have been available principally from GM dealers as a measure to protect owners from faulty or incorrect transmission lubrication. Under the new program, oil companies may obtain detailed requirements for transmission fluid from H. R. Wolf, assistant to the technical director of the GM Research Laboratories. The proposed fluids will be submitted to the Armour Research Foundation at Chicago to determine whether they meet GM specifications. If satisfactory, they

NEWS *of the* AUTOMOTIVE INDUSTRIES



PACKARDS BY THE ACRE

Just a portion of over 1500 new gold-colored Golden Anniversary Packards are shown here as they begin to move out of the Packard proving grounds near Utica, Mich. Driven by dealers to every state in the country, this is said to be the automobile industry's first postwar mass driveaway.

will then be put through performance tests at the GM proving ground. The data obtained will be reviewed by the GM technical committee. If the product is accepted, the oil refiners or manufacturer will be issued an "Armour Qualification Number" which will apply only to a fluid of identical composition and performance characteristics as the particular formula tested. All automatic transmission fluids marketed by petroleum companies to GM car owners will be identified by the qualification number embossed on the lid of all containers. Each company will use its own trade name, and, in addition, the general term "Automatic Transmission Fluid—Type A." The letter "A" indicates that the fluid is for passenger cars. Subsequent types may be coded for trucks, buses and coaches.

GM dealers will continue to handle automatic transmission fluids, but under the new program it will be also available at filling stations making the proper lubricant available to motorists everywhere. Last fall Mr. Wolf proposed that the motor car and petroleum industries get together on a standardization program to supply owners with proper fluids for automatic transmissions. It has been estimated that well over a million GM automatic transmissions of the Hydra-Matic or Dynaflow type are in use, providing a sizable market for a standardized fluid suitable for both types of transmission. In addition, Hydra-Matic will probably be used on other makes of cars in the near future, greatly expanding the market.

Changes in Fruehauf Top Management

Roy A. Fruehauf has been elected president of the Fruehauf Trailer Co., and Harvey C. Fruehauf, former president, has been made chairman of the board of directors. The new president is 39 years old. Harry Fruehauf, brother to the chairman and president, is first vice-president. The new president was named vice-president in charge of the western division in 1935; in 1938, vice-president and director of sales; in 1940, vice-president in charge of operations; and, in 1944, executive vice-president.

GM Sells Holdings in Transit Lines

GM has disposed of its stockholdings in National City Lines, a holding company controlling a number of local transportation companies in various cities. The Phillips Petroleum Co. and the Standard Oil Co. of Calif. have also disposed of their stock holdings in the company at the same time.

Kaiser-Frazer Reports $5.8 Million Loss

The Kaiser-Frazer Corp. reports a loss of $5,805,298 for the first quarter of 1949. The loss compares with a profit of $2,288,000 for the first quarter of 1948. Edgar F. Kaiser, president, said that the loss resulted from reduced prices on its cars and changeover costs for new models. He revealed that the price cut ranging from $198 to $333 in March cost K-F approximately $4.1 million in dealer refunds. In addition a three-weeks shutdown of the plant in February and March for changeover to new models was a contributing factor, he said. Currently, sales are averaging approximately 2½ times the weekly average of the first quarter of this



MULE ON THE RUNWAY

The American-Coleman Co., Omaha, Neb., has received a contract for 20 specially designed "Mules" to tow the USAF's B-36 bomber on airport runways. The 16-ton vehicle, an adaptation of the Coleman four-wheel drive truck, has a 25,000 lb drawbar pull, and is powered by a 113-hp Buda Diesel engine.

year. The company is now devoting approximately 50 per cent of its production to the Traveler utility vehicle.

Ford Completing $1.5 Million Waste Disposal Systems

Costing over $1.5 million, waste disposal installations will be completed during 1949 by the Ford Motor Co. to improve control of waste waters within its Rouge plant. Included among some of the major units being installed are an oil skimmer to remove waste oil from mill water leaving the plant; extensive facilities to dispose of waste steel pickling liquor; and a new system for elimination of coke oven wastes. Steel pans and cement curbs have been installed under 615 machines at the Rouge for collection and elimination of waste oil.

Strikes Wreck Chances for Record Output

The strike at the Ford Motor Co., and a rash of smaller disputes in the automobile industry have effectively ruined the industry's chances of surpassing the all-time record for second quarter production established in 1929. Until labor trouble intervened, chances for smashing the record for three months production which had stood for 20 years were very bright. Weekly production records were mounting week by week through April, and showed every indication of continuing the upward trend during May, when the Ford strike brought that happy situation to a sudden halt. The basic issue in that strike is a charge of speed-up, which the union has normally been willing to arbitrate. In fact, more than 200 similar cases have been arbitrated up to the time the strike was called, adding weight to the company's charge that union politics lies at the bottom of the dispute. Ford is standing firm on the premise that the issue is so basic that any retreat is impossible. It has however, continued its offer to have the dispute arbitrated as provided for under the contract. All Ford operations except coach building at the Highland Park plant have been down, and thousands of suppliers were affected.

C. D. Sterling Resigns as Hudson Secretary

C. D. Sterling has resigned as secretary of the Hudson Motor Car Co. because of illness. He joined Hudson in 1916 as a clerk, rose to director in 1930, and was named secretary in 1936.



Acme

CONVERTIBLE FROM THE CONTINENT

With a domestic price of $8000, Czechoslovakia's new rear-engined convertible, the Tatraplan, is reported to have a top speed of 90 mph. Production of this model is still in the early stages, and none are being exported.

The board of directors has elected Andrew Hood to succeed Mr. Sterling as secretary. He has served as treasurer of Hudson since 1936, and will continue in that position in addition to his duties as secretary. He had been secretary of the company once before from 1932 to 1936 when he was made treasurer. He started at Hudson as a cost clerk in 1920.

Nash's 1950 Models to Have Automatic Transmission

Although Nash has an option to use the Hydra-Matic transmission, it also has an option on another automatic transmission from an independent producer, and, in addition, has a design of its own. The company has not made a final decision as to which unit it will adopt. However, in view of the engineering changes that would be required to adapt Hydra-Matic to the Ambassador model, there is little chance that it could be used before late this year. Nash does intend to adopt some form of automatic drive for its 1950 Ambassador model, and it will be optional at extra cost. In connection with the Hydra-Matic, it is reliably reported now that all automobile companies with the exception of the Chrysler Corp. and Packard have been investigating the posssibility of acquiring the Hydra-Matic transmission. Ford's Lincoln-Mercucy Div. is already definitely committed, and it is entirely possible that other companies may make a similar arrangement. Kaiser-Frazer is known to be definitely interested. Nothing yet is known as to what the unit would be called on other makes of car.

British Ford Plans $40 Million Plant Expansion

An expenditure of $40 million is planned by British Ford for extensions and new equipment of its Dagenham plant to meet increased production, changes of models, and the increasing demand for parts. British Ford production in 1948 was 153,115 units, including tractors, and the profit for the year was $24,588,672.

Koppers Completes New Gas-from-Coal Plant

The Koppers Co., Inc., has announced the completion of the coal gasification phase of the gas synthesis demonstration plant now under construction for the Office of Synthetic Liquid Fuels, U. S. Bureau of Mines at Louisiana, Mo. The plant, designed and built by Koppers in conjunction with the Bureau of Mines, will, when completed, convert 28 tons of run-of-mine coal to approximately 80 bbl of synthetic fuels a day using a synthesis gas, principally carbon monoxide and hydrogen, produced in a Koppers-type coal gasifier and a modified Fischer-Tropsch synthesis process. The modifications employed well adapt this process to the production of either a good grade of motor gasoline or an excellent Diesel

fuel. The completed gas synthesis demonstration plant will consist of four distinct phases: (1) coal gasification; (2) gas purification; (3) hydrocarbon synthesis; and (4) refining of products. This plant is the first of its kind in the United States to make synthesis gas via the oxygen-pulverized coal gasification route.

Keller Motors Files Stock Issue with SEC

Keller Motors Corp., Huntsville, Ala., has filed a registration satement with the SEC for a public offering of five million shares. Keller initially plans to put into production the Keller station wagon, a four-cyl car weighing 2250 lb, with an overall length of 168½ in. and an overall width of 63½ in.

It is reported that 18 working models of the company's line of cars have been built. The company's manufacturing facilities include a plant at Huntsville, a woodworking plant at Hartselle, Ala., and production equipment purchased from the Dixie Motor Car Corp., predecessor of Keller Motors. Chairman of the board is George D. Keller, former vice-president of Studebaker. H. C. Smith, owner of Henry S. Smith & Sons, engineering firm of Cincinnati, is president. Other officials also are ex-automobile company executives.

K-F Boosts Output 30 Per Cent

To meet retail sales demand, the Kaiser-Frazer Corp. has revised upward current output schedules over 30 per cent, according to Clay P. Bedford, executive vice president. Mr. Bedford said that the reception accorded the company's utility model has exceeded all expectations, and that it would comprise about 50 per cent of total output indefinitely.



MADE IN FOUR

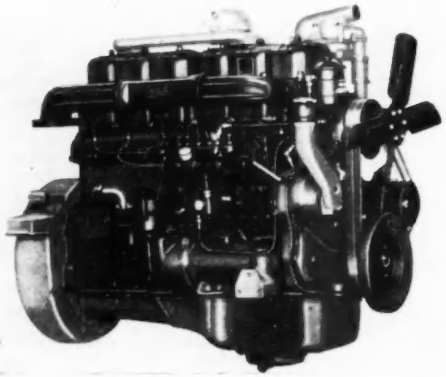
The Autocar Co. has announced this new Autocar tractor, the DC-74-T, available in four wheelbase lengths: 156 in. and 171 in. with the front axle under the forward end of the engine, and model DC-75-T in 142 in. and 157 in. with the front axle under the back end of the engine. With a GVW of 36,000 lb (based on 156-in. wheelbase), this model is powered by a Cummins six-cyl. 150-hp Diesel engine. A Cummins six-cyl. 165-hp Diesel engine is optionally available.

Upturn is Substantial in Spring Car Sales

There is no question in anyone's mind now that the normal spring upturn in car sales has been substantial. Evidence continues on all sides that sales are booming. Early in May, Kaiser-Frazer put into effect a 30 per cent upward revision of schedules, and resumed operations of its second final assembly line. The company reported that sales were double the level prevailing a month earlier. Despite a five-day shutdown due to the shortage of brakes, the company was expecting production of more than 9000 units in May. Nash deliveries in April rose to a 20-year high for that month, and the sales line was expected to be even higher in May. Oldsmobile reports that sales for the first four months of this year were 26.4 per cent greater than in the same period of last year. Studebaker has hit an all-time sales record and continues in a very strong position.

Briggs Profits Reduced by Chrysler Changeover

Net earnings of the Briggs Mfg. Corp. dropped sharply during the first quarter of this year compared with the same period of 1948. The net profit for the first three months of 1949 was $465,504, compared with $2,044,000 during the same three months a year ago. W. D. Robinson, president, said that the reduced earnings were due to the cost of converting production lines and equipment in seven major plants from old to new body styles. He added, however, that during the second quarter, production schedules will reach an all-time high based on schedules released by customers. Briggs supplies bodies to Plymouth and Packard.



MACK MIGHT

One of Macks three new Diesel engines, recently put into production, the six - cyl END 672 with a 4⅞ in. bore and 6 in. stroke has a piston displacement of 672 cu in. The END 672 is rated at 165 hp, while the other two models, the END 457 and 510 are rated at 110 hp and 135 hp respectively.

General Tire Consolidates Subsidiaries

Consolidation by the General Tire & Rubber Co. of its two subsidiaries, the Marquardt Aircraft Co., Van Nuys,

Calif., and General Tire and Rubber Co. of California, South Pasadena, has been completed, according to A. H. Rude, managing director of General Tire's research and development activities in Southern California. The consolidated facility will be known as the Marquardt Aircraft Co., whose personnel of 150 has been augmented by another 100 employees from the General Tire and Rubber Co. of California. The manufacturing equipment from the latter concern has also been moved to the Van Nuys factory, with all operations discontinued in South Pasadena.

Hispano-Suiza Readies Paris Plant for Hercules Output

The former Ballot factory in Paris, now owned by Hispano-Suiza, is being equipped for the production of American Hercules Diesel engines under license. The Hispano-Suiza plant will be capable of producing 30 engines a day. The French firm has no intention of building a complete truck, but will provide engines for truck and bus manufacturers, and for conversions.

GM Directors Approve Bonus Plan Review

Directors of GM have approved an amendment to the corporation's by-laws providing for review of company bonus plans by stockholders at various intervals, but in any case at least once every five years. Although directors can now change certain aspects of the bonus plan, they cannot without stockholders' approval alter major provisions such as the percentage of the profits to be paid out, or the level of earnings before there is a bonus distribution.

See Need for Premium Gas for About Half of All Cars

In an address before the American Petroleum Institute in St. Louis, Mo., recently, Julian J. Frey, general sales manager, Ethyl Corp., stated that just about half of all cars on the road need premium gasoline for knockfree performance. Explaining this broad need for premium gasoline, Mr. Frey pointed to three basic factors: (1) The increasing number of new cars which are being designed specifically for operation on premium gasoline; (2) the wide variation in octane requirements among automobiles of the same make and model; and (3) the higher octane requirements of the average car as it accumulates mileage.

USAF and Lockheed Announce New F-90 Fighter

Combining speed, range and maneuverability, the F-90 penetration fighter has been announced by the U. S. Air Force and the Lockheed Aircraft Corp. The F-90 is a swept-wing, needle-nosed fighter powered by two jet engines. The 40-ft wings sweep back from the fuselage at a 35-deg angle with rudder and elevator surfaces sweeping back at a comparable angle. The plane's overall length is about 55 ft, and its height at the tail is about 15 ft.

Twin Coach Nearly Completes Aircraft Parts Retooling

The Twin Coach Co.'s Buffalo plant has nearly completed its retooling program for large-scale production of aircraft parts. The plant will begin delivering aircraft parts to the Grumman Aircraft Engineering Corp., Bethpage, L. I., produced under a multimillion-dollar sub-contract received by Twin Coach from Grumman. Twin Coach is also making aircraft parts for the Republic Aviation Corp. and the Fairchild Engine & Airplane Corp.

Playboy to Surrender Plant to WAA

Federal Judge John Knight has authorized the Playboy Motor Car Corp. to surrender to the War Assets Administration the former war plant in Tonawanda, N. Y., that it has been occupying under lease. A Playboy option to buy the plant for $2,259,000 expired May 8th. The move will cut overhead expenses $5400 a month. Edward H. Kavinoky, attorney for Trustee Allen H. Gardner, explained that Playboy has been paying $2500 a month rent for the plant, formerly known as the Chevrolet Aviation Plant No. 1.

Approve New Weight for Stratofreighter

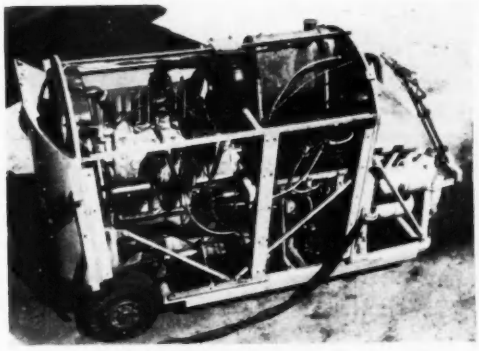
Boeing C-97A Stratofreighters, now in quantity production for the U. S. Air Force, have been approved for operation at a new gross weight of 148,000 lb, the Boeing Airplane Co. has announced. The first of the new series C-97A's is nearing completion at the Boeing Renton (Washington) plant near Seattle, and a total of 50 of the double-deck cargo and troop-carrying transports is on order. The Stratofreighter is a military counterpart of the commercial Boeing Stratocruiser, and will serve as teammate of the Boeing B-50 Superfortress.

U. S. Vehicle Exports Far Below Year Ago

Exports of motor vehicles from the U. S. for the first quarter of this year totaled only 86,569 units, far below the 116,961 exported during the same period in 1948, according to the AMA. Exports represented only 6.3 per cent of factory sales, compared with 8.25 per cent for the same period last year, and an average of about 10 per cent before the war. The cars shipped abroad during March showed a slight increase over the first two months of this year, totaling 31,936 vehicles, compared with 27,456 in February and 27,177 in January. A breakdown of first quarter exports shows 44,592 cars, 41,723 trucks, and 254 buses. There have been indications recently that export trade may strengthen later this

A DODGE FOR JETS

Solving a problem for the U. S. Air Force, this Dodge engine with Fluid Drive is being used to drive an Auxiliary Power Unit to start new jet planes. This unit is said to have reduced starting time to a matter of seconds.



NEWS *of the* AUTOMOTIVE INDUSTRIES



Acme

TWO BEHIND

Taking off from a wet runway, the Navy's first jet-powered patrol plane, the Martin Mercator, is powered by two Allison J-33 jet engines mounted behind two Pratt & Whitney Wasp Major reciprocating engines.

year. Canada recently eased modified import restrictions on American-made vehicles, and there is some hope that other countries may do likewise before the year is over. Currently, South America is the strongest foreign market for U. S. cars.

Gas Turbine Engines Power New British Airliner

Built by Vickers - Armstrong, the British Viscount, said to be the first commercial transport to fly entirely on gas turbine engines, was recently flown in England. Powered by four Rolls-Royce gas turbine engines of 1400 hp each driving propellers, the production version of this plane will carry 50 passengers.

British Exported Over 22,000 Cars in March

Total British automobile exports for March reached the high level figure of 22,500 units, valued at more than $24.4 million. This was $2.4 million more than new target of $22 million monthly average to be reached at the end of this year. Of the total exports, 7000 went to Australia. Truck exports in March also reached a high level with 8400 units valued at $16 million. The monthly target average set by the Government was $14 million.



Acme

APPEARANCES ARE DECEIVING

Named the Helioplane because its takeoff and landing characteristics approach that of the heliocopter, while its appearance resembles a conventional airplane, this new light plane has successfully completed flight tests. Equipped with an 85-hp Continental engine, it was designed by Otto C. Koppen, professor of aeronautical engineering at MIT to specifications by Dr. Lynn Bollinger of Harvard, and built by the Helio Corp., Norwood, Mass. It is designed to clear a five-story structure 100 yds from its starting point, and can reportedly fly at a minimum speed of 27 mph with no risk of stalling or spinning.

Ford's Laboratory Chief Honored by Foundrymen

Gosta Vennerholm, supervisor of the metallurgical research section of the Ford processing laboratory, has been awarded the William H. MacFadden gold medal for contributions to the foundry industry. The award was made by the American Foundrymen's Society at its convention in St. Louis recently. Mr. Vennerholm joined Ford in 1924 on the chemical and metallurgical staff.

Bell Forms Subsidiary for West Coast Operations

The formation of a wholly-owned subsidiary, the Bell Aircraft Supply Corp., has been announced by the Bell Aircraft Corp. Incorporated in California, the new company has also been qualified to do business in Louisiana and Texas. Bell Aircraft Supply will handle the sale and service helicopters and parts on the West Coast, and will carry on helicopter field operations, including oil surveys, in the two southern states.

Fly New Navy Skyrocket with Rocket and Jet Power

The Navy D-558-2 Douglas Skyrocket recently flew for its first trial marking what is believed to be one of the first flights ever attempted under dual rocket and jet power. The D-558-2 Skyrocket is the advanced sequel to the Navy's D-558 Skystreak, straight-winged jet which in the course of its research investigations shattered the world speed record twice within five days in August, 1947.

New USAF XF-91 Makes First Test Flight

Designed and built by Republic Aviation Corp., the XF-91, the USAF's new high altitude interceptor fighter, recently made its first flight successfully at Muroc Air Force Base, Calif. The first U. S. plane to employ inverse tapering of the wings, which are wider at the wing-tips than at the intersection with the fuselage, the XF-91's length is over 45 ft and wing span is approximately 30 ft. Power for the initial flight of the XF-91 was supplied by a GE J-47 turbo jet engine with 5000 lb thrust. The airplane is also designed to utilize rocket motors for accelerated take-off and climb and for operation at high altitudes, but the rocket motors will not be used in early flight-testing.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Tide Water Gets Approval for New Transmission Fluid

The Tide Water Associated Oil Co. has received approval of its newly developed hydraulic transmission fluid, Veedol Hydro Trans Oil, for use in a new type torque converter, by a major truck and coach manufacturer, it has been announced by John T. McCoy, general supervisor of research and development for the company's eastern division.

Sun Electric Corp. Opens Detroit Training Center

The Sun Electric Corp. has just opened a new branch and technical training center in Detroit representing an investment of several hundred thousand dollars. The company spent more than $200,000 for completely renovating and remodeling its building, and in addition has acquired adjacent property for parking. The Detroit establishment brings to six the number of training centers operated by the company and several others are nearing completion. The purpose of the centers is to train operators in the company's nation-wide program of scientific diagnosis of automobile engines and electrical equipment. The pre-repair diagnosis using special testing equipment manufactured by Sun is designed to locate specific service needs, eliminate unnecessary operations and guesswork replacement, and indicate complete correction of all unsatisfactory operating conditions. Several automotive manufacturers have already announced programs based on the Sun development by endorsing the program for their dealer operations. Many independent shop owners are also installing the diagnosis equipment.

Basically, it involves a thorough and complete check of all operating units of the automobile. Making the test requires a specially trained technician who can run the tests, record results, compare them with factory specifications, and correctly analyze and interpret the findings into specific recommendations for correcting troubles revealed by the diagnosis. The educational and training program as announced at the Detroit preview is designed specifically to bridge the gap until the normal training channels are prepared to provide the necessary special corrections for development testing specialists. The course will be offered to manufacturer's zone service representatives and other supervisory personnel, instructors in trade and vocational schools, and qualified men interested in preparing for jobs as automotive diagnosticians. The service establishment at Detroit provides more than 15,000 sq ft of training area, and has adequate space for conducting seven different sessions simultaneouly.

Renault Building 300 Cars a Day

Renault has now reached the output planned at the close of the war: more than 300 passenger cars a day. The output of the rear-engine passenger car exceeded 300 a day in April, as a result, a pre-war model has been withdrawn, and the transfer line is now operating on a single assembly line. The tractor factory at Le Mans is being re-equipped for bigger production. Renault's net profit for 1948 was $3,016,000.

Koppers Names Agency for Piston Ring Advertising

The advertising for American Hammered Piston Rings, a product of Koppers Co., Inc., will be handled by Van-Sant, Dugdale & Co., Inc., Baltimore, Md., according to Ralph Winslow, Koppers director of public relations. Koppers is launching a major program on its new K-Spun piston rings, which includes a consumer campaign on automotive rings as well as a broad business paper campaign in the general automotive, fleet, original equipment, export, and industrial fields.

Backbone of 1960 USAF to be Pilotless Missiles

The backbone of the U. S. Air Force by 1960 will be pilotless guided missiles that can travel at speeds of 1200 to 1500 mph, according to John K. Northrop. The Air Force by that time may also have a limited number of giant, atomic-powered airplanes, Mr. Northrop said.

More Than 700,000 Oldsmobiles Have Hydra-Matic

Over 700,000 Oldsmobiles equipped with Hydra-Matic Drives have been produced since the latter's introduction on the 1940 models in the fall of 1939. According to D. E. Ralston, general sales manager, GM's Oldsmobile Div., the way in which GM Hydra-Matic Drive has taken its place as an accepted standard feature of the modern automobile is one of the highlights of 1949 spring sales.



Royal Canadian Air Force

MAPS FROM THE AIR

This RCAF Lancaster airplane is currently mapping Canada by aerial photographs. Over 500 persons and 30 aircraft, including two equipped for Shoran-controlled survey work, will try to map 947,000 sq mi this year. Concurrently, an air mineral search over Canada will use the first stationary magnetometer. This appears to be the forerunner of wide use of aircraft for many types of survey and exploration in Canada.

Classification of Chrysler Ignition Set-Up

To clarify the present ignition set-up on Chrysler Corp.'s cars, it should be noted that 10,000-ohm resistor type spark plugs are installed as standard equipment on all lines, including Plymouth. Similarly, the new splash-

(*Turn to Page* 58, *Please*)

Air Power



This Fouga glider is equipped with a 108-lb jet engine which gives a thrust of 198 lb. (Goldner photo)

EIGHTEENTH in a series of aviation shows spread over a period of 40 years, the display in the Grand Palais, Paris, was a magnificent piece of air propaganda of which the French nation could be proud. Just why a show of this nature was held is not easy to see, for it was not a financial success, and while it enabled the French to demonstrate the progress they have made since the invader was cleared out by the Allied Armies, it also emphasized the handicaps under which they are still operating.

There is no single building in France really suitable for a modern aero show, and the French sought to overcome this difficulty by dividing their exhibition into three sections. The Grand Palais housed the smaller planes, models of the larger machines, engines, equipment, accessories, historical divisions and educational sections, with a total of 300 exhibitors. A few hundred yards away, on the opposite side of the river, there was an open-air display on the Esplanade des Invalides, from the center of which a Westland Sikorsky S-51 helicopter took off daily, and finally, Orly Airfield (established by the American Air Force in 1917) was used for demonstrations.

The show was international, with the United States and England dominating. Other nations, however, were not shut out, the only absentees being Russia and, of course, Germany. Although still under Allied restrictions, Italy had a big display of the types of planes and engines she is allowed to produce, but, as was to be expected under the circumstances, there was nothing of outstanding merit. Holland, Czechoslovakia and even Turkey had booths in the hall.

By reason of postwar conditions, American planes and engines have secured a strong position in European countries. In France there is much discussion at the present time as to whether it is advisable to endeavor to make up the leeway resulting from the war, or whether the American lead should not be freely accepted and machines purchased from the United States. It is obvious that in big passenger-carrying planes America has made such technical advances and has such efficient means of production that it is almost impossible to attain her level. Out of the vast amount of French designs produced since the Liberation, practically only one big-capacity plane has emerged. This is the Languedoc, a four-engine, 33 passenger liner in regular service on Air France lines.

American Exhibitors at the Paris Show:

Aeronautical Instrument & Radio Co.
American Overseas Airlines
Beech Aircraft Corp.
Bendix Aviation Corp.
Douglas Aircraft Co.
Lockheed Aircraft Corp.
Consolidated Vultee Aircraft Corp.
Civil Aeronautics Administration
Continental Motors Corp.

Several big transport planes, however, are in an advanced stage and likely to go into regular service at an early date. Breguet is in production on his "Two Decker" a mid-wing monoplane designed to carry 97 passengers on two decks, or freight which can be loaded simultaneously on the upper and the lower decks. The first of these machines has flown and 14 others are under construction. Equipped with four Pratt & Whitney engines, the useful load is 15 tons, speed 210 mph and radius 600 miles.

The Breguet Mercury 892 is a medium cargo carrier with a capacity of 15 to 20 tons, a speed 180 mph and a radius of 600 miles. It is a high-wing monoplane, made in two versions, for lateral or for rear loading, the cargo hold in each case being fitted with an overhead traveling crane.

The largest of the French liners under construction is the "Armagnac" 2010, produced by the South-East National Aviation Co., designed for 108 seated passengers or 60 berths. The "Continental" version gives accommodation for 160 passengers. The "Armagnac"

in France

France's 1949 Aviation Show, 18th to Be Held During Past 40 Years, Features Open-Air Display at Esplanade des Invalides in Addition to 300 Exhibits in Grand Palais and Demonstrations at Orly Airfield. Strong Position Held by American Planes and Engines in Europe.

By W. F. Bradley
Special European Correspondent of AUTOMOTIVE INDUSTRIES

has a wing spread of 160 ft, a length of 128 ft, and a fuselage diameter of 15 ft. It is a low-wing monoplane with a take-off weight of 70 tons. The four engines will be Pratt & Whitneys and should give the plane a speed of 285 mph as a long-distance cruiser and 270 miles for the "Continental" version.

Numerous new designs of quite a promising nature were shown by the French manufacturers. From the South-West nationalized factory came the "Espadon" 6020 single seater powered by the Hispano-Suiza Nene jet engine. This made its first flight at the end of last year, and is expected to have a speed of 620 mph. It is a swept-back mid-wing monoplane, with an air duct for the Nene below the fuselage just forward of the trailing edge. It is claimed to be the fastest and the most heavily armed of the French fighters.

Another model shown by the same firm was the SO M2 experimental supersonic machine powered by a Derwent V jet engine. It has a completely flat cockpit roof, so that



A prototype of the latest French jet fighter plane, the SE 2010, at the show. (World Wide photo).



Bristol helicopter which was flown from London direct to the show.

pilot visibility is greatly restricted. For landing, however, the Perspex top can be hinged up to form a small windshield and the pilot's seat can be raised. The undercarriage, too, is distinctive in that it consists of three retractable wheels in line under the fuselage. There is a fourth steering wheel in front and retractable wing-tip skids. The manufacturer is featuring a new sandwich wing construction made up of dural-balsa-dural, with a spruce member taking the place of the balsa in the leading edge, and a light metal rear spar to which the inner and outer aluminum alloy skins are riveted. The main advantage of this construction is the regularity of the laminar-flow profile.

Another outstanding French jet plane exhibited was the Marcel Dassault, an order for which was placed only last July and which made its first flight in February, this being done under private enterprise. Known as the "Ouragan," it is a low-wing monoplane with a Hispano-Suiza Nene jet engine with a single fuselage, nose inlet and a bifurcated duct passing each side of the cockpit. The jet issues from a single orifice at the rear of the fuselage.

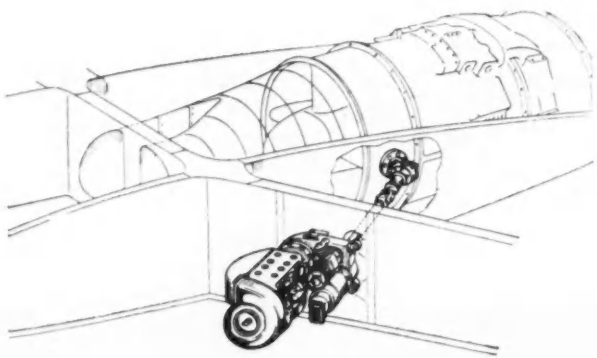
Another jet fighter, the Breguet 960, was shown in model form only. A distinctive feature of this low-wing monoplane is a Nene jet in the fuselage and a Mamba prop-jet in the nose, this combination of jet and prop-jet being expected to give a combat speed of 560 mph. For cruising, the Mamba only would be used, the expected speed being 233 mph.

A distinctive undercarriage was shown by Morane-Saulnier. On being retracted the carriage folds inward and the two wheels are turned in such a way that they become close together under the fuselage with their axles transverse to the longitudinal axis of the fuselage. The wheels project just sufficiently to afford valuable protection in case of a belly landing.

Vickers-Armstrong featured the Vicount 700 air liner, naturally shown in model form only. Equipped with the new Rolls Royce Dart RDaX3, it is claimed to be the world's first propeller-turbine airliner. The Vicount 700 is a low-wing monoplane with a tricycle undercarriage, with a pressurized cabin for 53 passengers and a crew of four. The Vicount has a maximum take-off weight of 48,000 lb and its cruising speed at 25,000 ft is 322 mph.

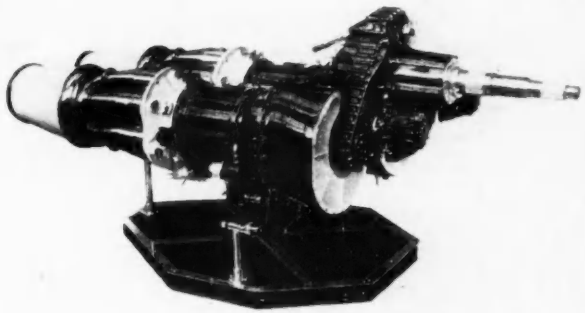
There were two helicopters in the Grand Palais; one was the Bristol which flew from London, landed in the street and was then towed into the hall. The other was a new Breguet with twin rotors, which had not yet passed the experimental stage.

Club and private aircraft were mostly of French construction, with Beechcraft representing the United



(Left) A two-cylinder, two-stroke gasoline engine is arranged as shown in this sketch for starting the Atar 101 jet engine.

Armstrong-Siddeley double Mamba engine. Maximum shaft horsepower for take-off at sea level is 2540 in addition to a jet thrust of 770 lb.



States. The Fouga Co. struck a new note with a glider equipped with the small Turbomeca jet engine. This is the second prototype and has been designed as an acrobatic trainer and for high-altitude experiments. It is a mid-wing type of 42.6 ft span, with high dihedral tail planes.

Since the last show considerable progress has been made by the French industry in the production of jet engines. Hispano-Suiza has secured a license for Rolls Royce jets and at present is producing 10 Nenes a month. This figure will be increased to 20 at a very early date. This appears to be the only jet in regular production in France, the others having been developed since the Liberation, in several cases from designs worked out secretly while the enemy was in power.

The smallest jet engine in the show was presented by Turbomeca, built under Szydlowski patents. With a weight of only 108 lb a diameter of 15¾ in. and a length of 31 in., it gives a thrust of 198 lb. This engine has an annular combustion chamber, with rotary injection, a radial compressor and a one-stage turbine. It was shown fitted on a Fouga glider, above and back of the pilot's cockpit. It enables the machine to get off the ground without towing, to attain a speed of 180 mph, and to rise to an altitude of about 30,000 ft. A low powered Turbomeca gas turbine has undergone 150 hours of official tests under the control of the French Ministry of Aviation. This turbine has operated 250 hours, of which 30 were at 110 hp, 200 hours at 100 hp and the rest at less than 100 hp. The use for which it is intended is the operation of generators, air conditioning plants, etc., on big passenger planes, where it is claimed that its low weight and small volume will enable it to compete successfully against the piston engine.

One of the first French jet engines to reach the production stage is the Atar 101 designed by the Voisin Aeroplane Co. and manufactured at Decize by the SNECMA. This machine has a static thrust of 4860 lb, its length being 112 in., diameter 34.9 in., and its weight without accessories 1875 lb. It features a seven-stage axial flow compressor. The annular combustion chamber has 20 single burners and dual-flow fuel injectors with downstream injection. The Atar has a single stage turbine with sheet steel guide vanes, the turbine disk having 53 inserted hollow air-cooled blades of high tensile, heat-resisting sheet steel, with Laval roots. The compressor shaft is coupled to the turbine shaft by an elastic tooth coupling for compensating axial thrust. A feature of this power plant is an auxiliary two-cylinder, two-stroke gasoline unit which develops 25 hp for starting and has a continuous output rating of 16 hp. It is connected up by a universally jointed shaft and can occupy any position up to 90 deg from the longitudinal axis. In addition to its use for starting, it can be employed to drive accessory units.

Another jet engine developed secretly under the

(*Turn to page 62, please*)

Cutaway view of Atar 101, one of the first French jet engines to reach the production stage.

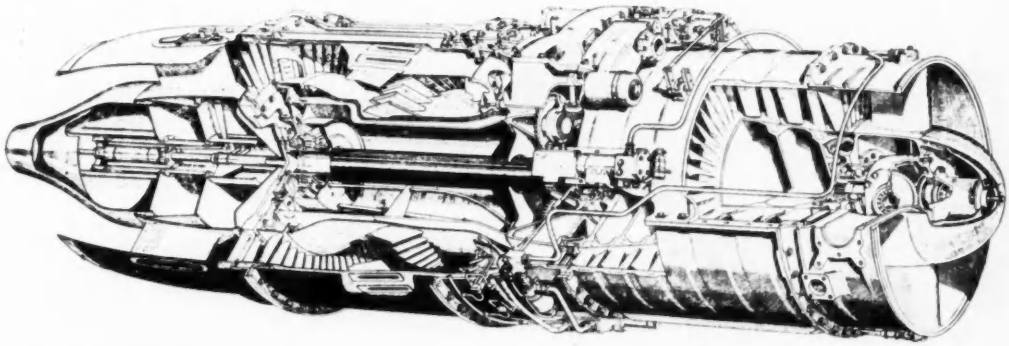


Table 1
Condensed List of Applications of Diesel Engines

- **High speed automotive type Diesel engine (5-500 hp)**
  - Motor trucks
  - Buses
  - Tractors
  - Farm machinery
  - Marine
  - Logging machinery and lumber camps
  - Sawmills
  - Cement and quarry installations
  - Heavy off-highway vehicles
  - Oil field rigs and machinery
  - Pumping units, compressors, motor-generator sets
  - Automatic stand-by power
  - Cotton gins
  - Irrigation
- **General Diesel applications (Up to 800 hp)**
  - Stationary powerplants
  - Stand-by powerplants
  - Ship propulsion
  - Railroad locomotives

The Growing Automotive

THERE is substantial evidence that the automotive high speed Diesel engine field is far more important than it appears. Although discussion usually centers upon Diesel engines for trucks and buses, recent estimates indicate that this particular area of applications accounts for about 12 per cent of total horsepower ranging from engines of smallest displacement to those rated up to 500 hp, the rest going into marine, tractors, and various industrial uses.

As shown in Table 1 the applications of Diesel engines are quite extensive. As a matter of fact the list is abbreviated and doubtless could be expanded considerably. From a sales standpoint, the market should include not only known original equipment applications but replacements of existing power as well, particularly replacement of steam for marine, road building, and hoisting and excavating equipment now somewhat in use.

At the present writing there is a paucity of authentic figures on the population of Diesel engines in the United States; and nothing at all is known about the rate of retirement from service. Unquestionably this stems from a reluctance on the part of producers to exchange information on sales volume. It is encouraging to learn that the picture is changing and there is reason to believe that better information will become available in the near future, to the benefit of the entire Diesel engine industry.

While there is a definite lack of authentic data on the population of Diesel engines in the United States, the Bureau of the Census has just released a most comprehensive report concerning the production of Diesel and semi-Diesel engines during 1947. This report shows that 118,879 Diesel engines were produced during that year. Additional details were published in the May 15, 1949, issue of AUTOMOTIVE INDUSTRIES.

Historically, the greatest impetus to the development of the high speed Diesel engine occurred in the

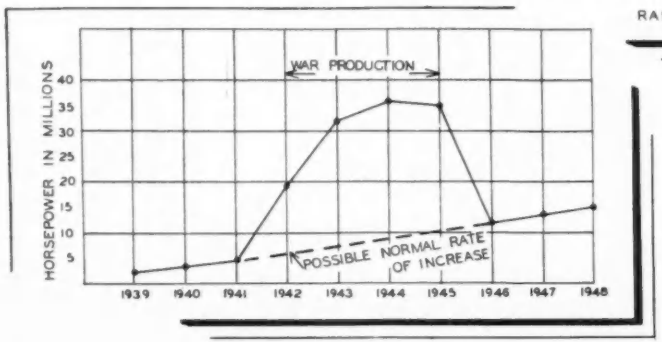


Fig. 1 (Left). Yearly production of Diesel engines in million hp.

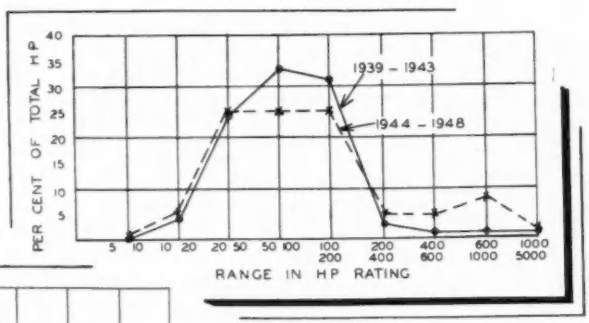


Fig. 2 (Above). Distribution of Diesel engines by percentage of total hp. by hp. range.

Application of Diesel Engines

By Joseph Geschelin

early 1930's with the beginnings of applications in motor trucks and buses. According to the latest estimate made by the Statistical Department of AUTOMOTIVE INDUSTRIES, as of the end of 1948, there was a population of about 15,000 Diesel trucks and truck-tractors; and 20,000 buses. This does not begin to picture the total extent of use in trucks and buses. For instance, over 2400 Diesel-equipped trucks and bus chassis were exported during 1948. As a matter of fact, so far as trucks and buses are concerned, the export market, particularly in South America, still represents an important potential.

The four war years—1942 to 1945 inclusive—marked the most gigantic expansion of Diesel power because of the dieselization of the U. S. Navy. The Navy establishment alone consumed some 60 million hp in engines of all sizes, ranging from the smallest to the 2000-hp units for submarines. Much of the wartime impetus and facilities have been translated into Diesel power for railroad locomotives.

Based upon an interpretation of statistics on estimated Diesel engine production (in hp) published by *Diesel Progress*, Fig. 1 shows production estimates for the years 1939-1948 inclusive. The abnormal increments during the period 1942-1945 show up rather dramatically. Whether or not it is valid from a formal

(*Turn to page* 64, *please*)

Table 3
Percentage of all Diesel Engines in USA[1] Estimated in Sub-Zero Belt[2]

STATE	Per Cent
Maine	0.2
New Hampshire	0.3
Vermont	0.1
Northern New York State	1.9[3]
Upper Michigan Peninsula	0.8[3]
Wisconsin	1.2
Minnesota	1.4
Montana	0.5
North Dakota	0.6
South Dakota	1.4
Total Per Cent	8.4

1—Automotive Diesel engines only.
2—Belt defined by automotive industry in field testing for cold weather operation.
3—This figure is 50 per cent of total for state.

Table 2
Distribution of Diesel HP By States*
(to Jan. 1, 1937)

RANK	STATE	HP	PER CENT	RANK	STATE	HP	PER CENT
1	Texas	982,200	14.69	28	Oregon	62,100	.93
2	Oklahoma	681,400	10.2	29	Alabama	53,400	.80
3	California	628,000	9.39	30	Virginia	51,000	.76
4	Kansas	602,800	9.01	31	Colorado	49,700	.74
5	Missouri	276,100	4.13	32	Tennessee	48,600	.73
6	Iowa	258,000	3.86	33	Nevada	47,900	.72
7	Nebraska	256,300	3.83	34	Kentucky	42,100	.63
8	New York	253,200	3.79	35	North Dakota	39,500	.59
9	Louisiana	188,000	2.81	36	Georgia	38,800	.58
10	Pennsylvania	181,700	2.72	37	North Carolina	34,000	.51
11	Florida	171,300	2.56	38	West Virginia	33,000	.49
12	Arizona	164,600	2.46	39	Montana	31,500	.47
13	Mississippi	144,400	2.16	40	Utah	21,300	.32
14	Illinois	143,100	2.14	41	Delaware	17,600	.26
15	New Mexico	131,800	1.97	42	New Hampshire	17,400	.26
16	Michigan	96,800	1.45	43	South Carolina	11,500	.17
17	Washington	94,300	1.41	44	Connecticut	9,400	.14
18	Arkansas	91,900	1.37	45	Maine	9,400	.14
19	Minnesota	91,200	1.36	46	Idaho	9,300	.14
20	South Dakota	89,300	1.34	47	Rhode Island	7,200	.11
21	Wisconsin	81,800	1.22	48	Vermont	5,400	.08
22	Massachusetts	81,400	1.22				
23	Ohio	78,100	1.17				
24	Maryland	76,000	1.14				
25	Indiana	71,700	1.07				
26	Wyoming	67,100	1.00				
27	New Jersey	64,200	.96				

*—The source of these data is a prominent Diesel engine manufacturer who has found that even with the greatly increased Diesel engine use the percentage hp distribution remains practically the same today as shown in this table. No later official data are available.



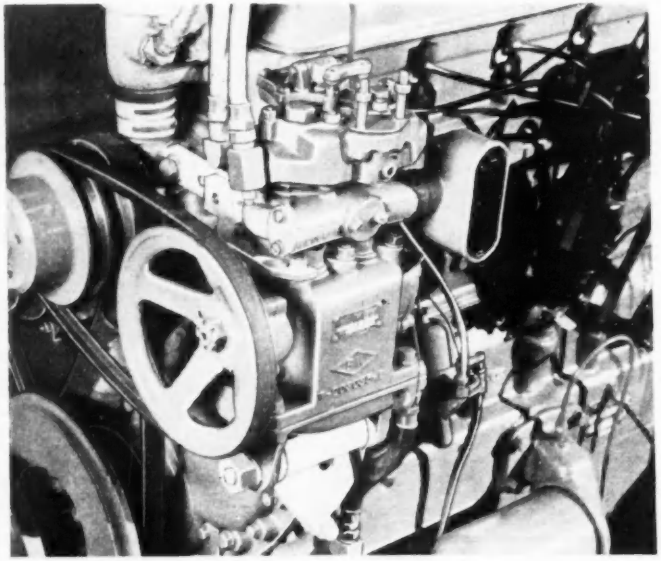
GMC Introduces 61

CONSISTING of 61 basic gasoline and Diesel engine powered models, the new heavy-duty truck line introduced by GMC Truck & Coach Div., General Motors Corp., has a range of gross vehicle weights from 19,000 to 75,000 lb, and gross combination weights exceeding 90,000 lb for vehicles in off-the-highway operations.

Generally speaking, the line features more powerful engines, including five new gasoline models, improved frame and chassis features, roomier cabs, and massive functional sheet metal design having a family resemblance to GMC's light and medium duty models. Power steering is offered as optional equipment on models from 770 up.

Among the entirely new models added to the line are: High speed tractors for fast hauls—the 640 Series with a 177-hp gasoline engine, and the 740 Series with either a 190-hp gasoline engine or the 4-71 Diesel; gasoline and Diesel six-wheelers with GVW ranging from 38,000 to 75,000 lb for logging, concrete mixers, oilfield work, and other extra heavy jobs; new Diesel-powered dump chassis, and tractors. Where operators are up against short-length limitations, GMC offers the high-powered 900 Series with overall length shortened by about 18 in.

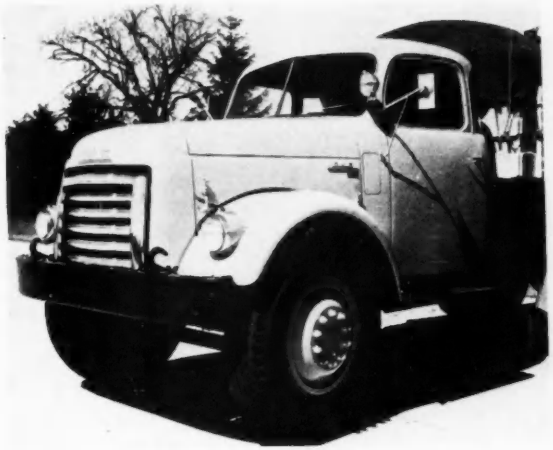
Doubtless the most important



Air compressors on gasoline engines are mounted on a hinge bolt as shown in this illustration. A notched adjustment strap permits quick, easy adjustment or renewal of the belt.

Here are five of the many new models in the "H" line.

This 850 Series truck is powered by a 502.7 cu. in. engine which develops 165 hp (governed) at 2800 rpm.



Gross Vehicle Weights of Trucks Range from 19,000 Lb. to 75,000 Lb. for Highway Operation. Many Improvements in Gasoline and Diesel Engines with Six-Cylinder 300-Hp Diesel Under Development for Later Announcement.

Heavy Duty Models

single feature of the line is the introduction of the new gasoline engines, including a 707 cu in. engine intended for models heretofore exclusively Diesel-powered.

For the Diesel line GMC continues the 4-71 and 6-71 engines which develop 135 and 200 hp respectively. They will offer later the new "110" six-cylinder 300-hp Diesel which is now in the development and test stages. On the Diesels, compression ratio has been upped to 17 to 1 and the engines fitted with tractor type air cleaners.

Consider the new group of gasoline engines. Common to all models is an increase in compression ratio from the former 6 to 1 to 6.5 to 1. In addition, the following features are common to all gasoline engines:

Chromium-plated top piston rings.

Heavier rocker arm assemblies and push rods.

Stellite-faced exhaust valves; and alloy insert seats in the head.

Exhaust valve rotators.

Intake valves now have 30 deg seats instead of 45 deg.

New camshaft with higher lift for intake valves.

Duplex carburetors replace single-throat type.

Intake manifolding redesigned to provide better fuel distribution.

Precision type, steel-back, Moraine Durex bearings for mains and connecting rods.

Moreover, on the larger engines—360, 426, 503, and 707—exhaust valves are sodium cooled. With further reference to the carburetor, on conventional models using 426 through 707 engines, and on all COE's, carburetors are installed horizontally with tractor type air cleaners mounted on the engine side of the dash. Intake manifolds are of three-port type with each port feeding two cylinders.

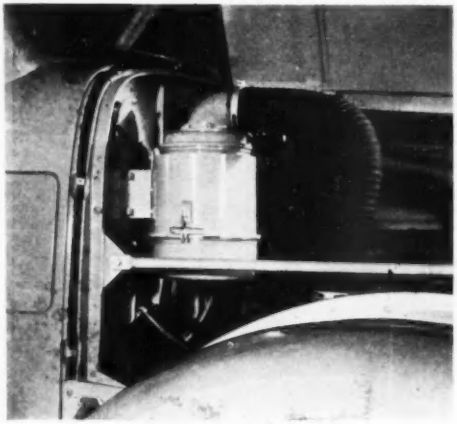
So far as accessories are concerned, the generators are low mounted and away from exhaust heat, this being made possible by wider, straight side rail frames. Air compressor mounting is of hinge-bolt type with a notched adjustment strap to permit ready adjustment or replacement of the belt.

A six-valve fuel pump

Condensed Specifications for Gasoline Engines GMC Heavy Duty Models

(All Valve-In-Head Type)

Model	318	360	426	503	707
Number cylinders	6	6	6	6	6
Bore (in.)	3 7/8	4 1/8	4 1/4	4 9/16	5
Stroke (in.)	4 1/2	4 1/2	5	5 1/8	6
Displacement (cu in.)	318.4	360.8	425.6	502.7	707
Compression ratio	6.5 to 1	6.5	6.5	6.5	6.5
Gross hp (max.)	136 @ 3400 rpm	150 @ 3200 rpm	177 @ 3200 rpm	190 @ 3000 rpm	225 @ 2200 rpm
Net hp (governed)	112 @ 3000 rpm	127 @ 3000 rpm	146 @ 2800 rpm	165 @ 2800 rpm	.....
Gross torque (max. lb ft)	245 @ 800-2000 rpm	289 @ 800-1700 rpm	337 @ 900-1500 rpm	415 @ 900-1500 rpm	630 @ 1200 rpm
Net Torque (lb ft)	230 @ 800-2000 rpm	271 @ 800-1700 rpm	324 @ 900-1500 rpm	400 @ 900-1500 rpm	.....
No. main bearings	7	7	7	7	7



On conventional models using 426, 503 and 707 engines, and on all gasoline engine powered COE models, carburetors are installed horizontally and connected by flexible tubing to dash-mounted air cleaners.

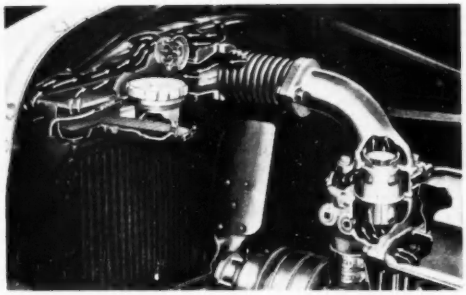
is introduced for use on the 426 and 503 engines, providing an adequate flow of fuel under peak power conditions. Hydraulic brake models are fitted with a special vacuum booster pump for improved windshield wiper operation. Replacing the former velocity governor is a positive gear driven mechanical governor, for accurate control under all operating conditions.

Finally, all engines are mounted at the front in a new "collar" type rubber-lined engine mount, permitting movement without affecting fan and radiator clearance.

Two types of heavy duty clutches are available—the single disk type with vibration damper for regular models; and a solid disk type for dump models and heavier gasoline and Diesel models.

Cooling systems have been improved. Water pumps are new and provide a capacity range from 90 to 100 gpm depending upon engine size. A large by-pass valve in the pump restricts circulation when the engine

(*Turn to page* 68, *please*)



Cut-away view showing arrangement of enlarged radiator top tank and double-acting thermostat in the water outlet of the engine.

GMC Heavy Duty Line Listing of Models, Type, Rating and Engine

GASOLINE

Series Number	GVW	Engine
TRUCKS		
HC-520	19,000 lb	318
HF-520	19,500 lb	318
HC-600	22,000 lb	318
HF-600	23,000 lb	318
HC-620	22,000 lb	360
HF-620	23,000 lb	360
HC-640	22,000 lb	426
HF-640	23,000 lb	426
HC-650	24,000 lb	318
HF-650	25,000 lb	318
HC-700	27,500 lb	360
HF-700	30,000 lb	360
HC-720	27,500 lb	426
HF-720	30,000 lb	426
HC-740	28,500 lb	503
HF-740	31,000 lb	503
HC-750	30,000 lb	503
HF-750	33,000 lb	503
HC-850	35,000 lb	503
HF-850	37,500 lb	503
HC-900	35,000 lb	707
HC-910	28,500 lb	707

SPECIALIZED TRACTORS

	GVW	
HCR-520	35,000 lb	318
HFR-520	35,000 lb	318
HCR-620	40,000 lb	360
HFR-620	40,000 lb	360
HCR-640	40,000 lb	426
HFR-640	40,000 lb	426
HCR-720	45,000 lb	426
HFR-720	45,000 lb	426
HCR-740	65,000 lb	503
HFR-740	65,000 lb	503
HCR-750	65,000 lb	503
HFR-750	65,000 lb	503
HCR-900	65,000 lb	707
HCR-910	65,000 lb	707

SIX WHEELERS

	GVW	
HCW-720	38,000 lb	426
HFW-720	38,000 lb	426
HCW-850	55,000 lb	503
HCW-950	45,000 lb	707
HCW-970	55,000 lb	707

GASOLINE

Series Number	GVW	Engine
DUMPS		
HC-770	32,000 lb	360
HC-870	40,000 lb	426

GASOLINE

Series Number	GVW	Engine
HC-890	50,000 lb	503
HC-940	50,000 lb	707

DIESEL

TRUCKS		
HDC-740	28,500 lb	4-71
HDF-740	31,000 lb	4-71
HDC-750	30,000 lb	4-71
HDF-750	33,000 lb	4-71
HDC-900	35,000 lb	6-71
HDC-910	28,500 lb	6-71

SPECIALIZED TRACTORS

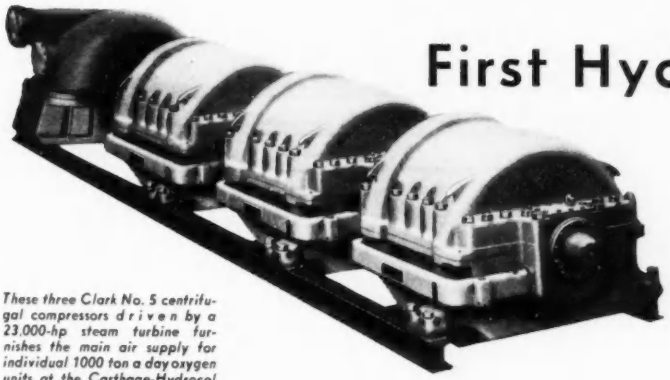
	GCW	
HDCR-740	65,000 lb	4-71
HDCR-750	65,000 lb	4-71
HDFR-750	65,000 lb	4-71
HDCR-900	65,000 lb	6-71

SIX WHEELERS

	GVW	
HDCW-750	38,000 lb	4-71
HDCW-950	45,000 lb	6-71
HDCW-970	55,000 lb	6-71
HDCW-980	75,000 lb	6-71

DUMPS

	GVW	
HDC-870	40,000 lb	4-71
HDC-940	50,000 lb	6-71



These three Clark No. 5 centrifugal compressors driven by a 23,000-hp steam turbine furnishes the main air supply for individual 1000 ton a day oxygen units at the Carthage-Hydrocol plant. The compressors were made by Clark Bros. Co., Inc., Olean, N. Y.

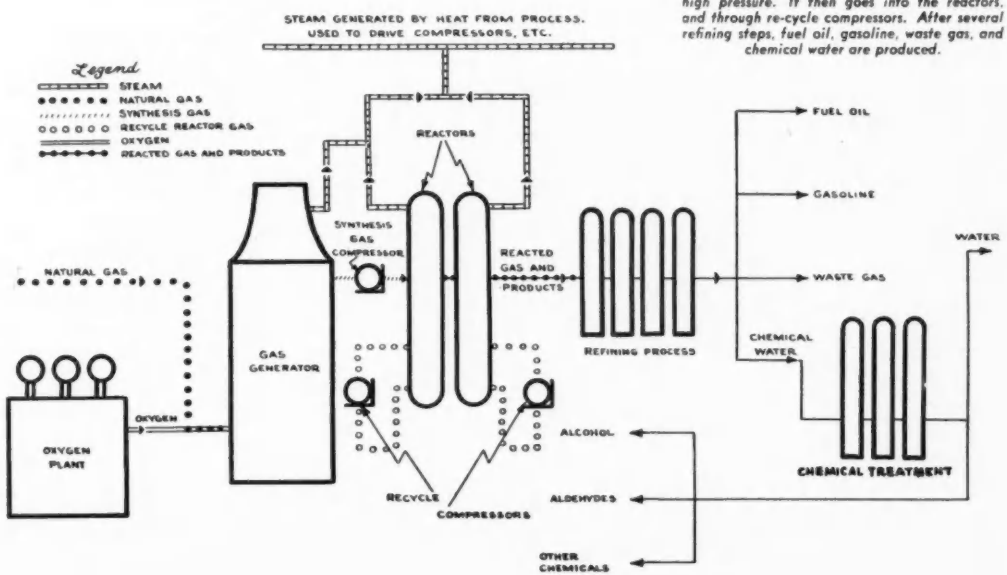
First Hydrocol Plant for Making Synthetic Gasoline

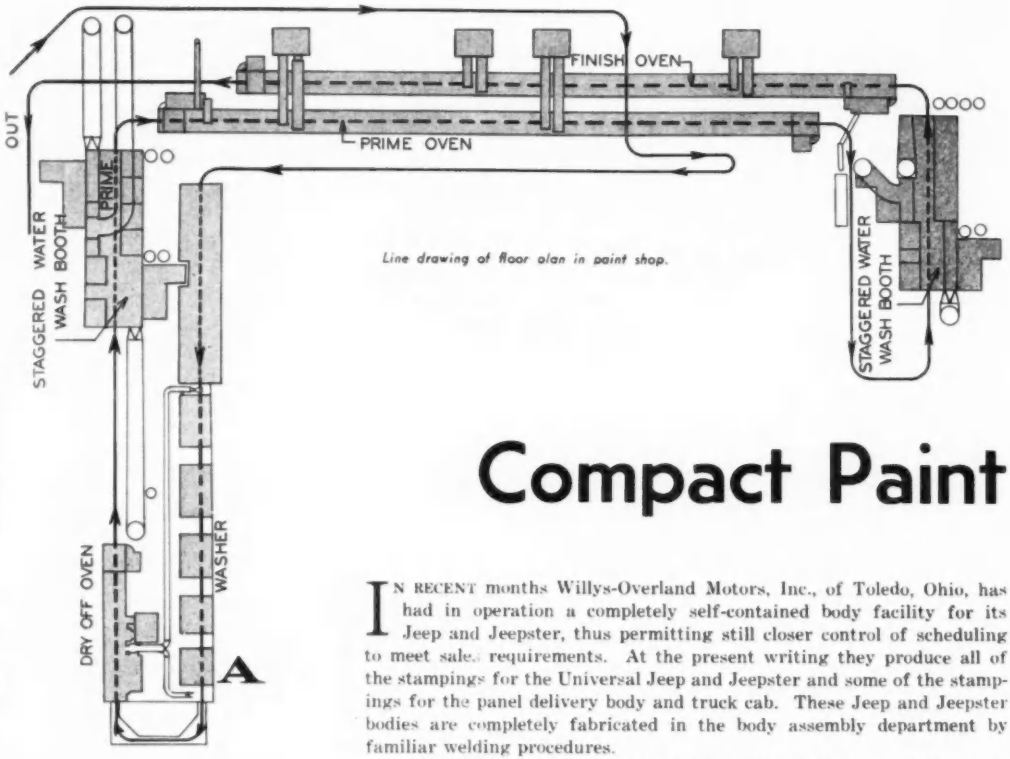
Now nearing completion at Brownsville, Texas, the first Hydrocol process plant for making gasoline from natural gas will incorporate 24 centrifugal compressors having a total of 80,000 installed hp, which is claimed to be the largest installation of centrifugal compressors in the world. Included in the setup are three Clark No. 5 compressors cases, this combination being the largest single shaft compressor ever built. These centrifugal compressors will compress six different gases ranging from air to pure oxygen, and the 110,000 cfm to 100 psi with a power requirement of 110,000 cfm to 100 psi with a power requirement of 23,000 hp.

It is expected that this new Carthage-Hydrocol plant will produce over 7500 bbl a day of synthetic gasoline and Diesel oil. In fact, Col. Ernest O. Thompson, commissioner, Railroad Commission of Texas, has stated that the Hydrocol process can easily mean an added 25 per cent to the motor fuel of America.

The Hydrocol process converts natural gas to a mixture of carbon monoxide and hydrogen, followed by catalytic reaction to make liquid hydrocarbons boiling substantially within the range of gasoline. High-grade Diesel oil and oxygenated compounds are by-products.

As shown in this simplified diagram flow chart of the Hydrocol process, oxygen and natural gas are partly burned in the gas generator to make synthesis gas which is further compressed to a high pressure. It then goes into the reactors, and through re-cycle compressors. After several refining steps, fuel oil, gasoline, waste gas, and chemical water are produced.





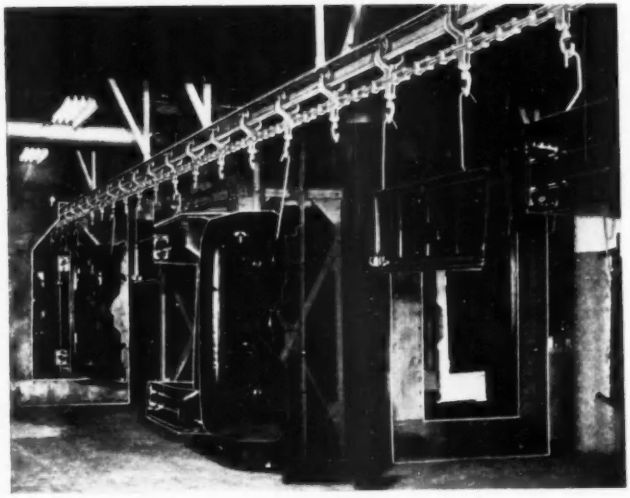
Line drawing of floor plan in paint shop.

Compact Paint

IN RECENT months Willys-Overland Motors, Inc., of Toledo, Ohio, has had in operation a completely self-contained body facility for its Jeep and Jeepster, thus permitting still closer control of scheduling to meet sales requirements. At the present writing they produce all of the stampings for the Universal Jeep and Jeepster and some of the stampings for the panel delivery body and truck cab. These Jeep and Jeepster bodies are completely fabricated in the body assembly department by familiar welding procedures.

In addition, all bodies used by the company, including station wagons and station sedans, are finished in the modern paint shop facilities. Two separate paint shops are maintained for this purpose—one to handle the larger bodies such as station wagons, station sedans, and truck cabs, boxes and panel delivery; the other is set up specifically for finishing Universal Jeeps.

Below is a head-on view of the two baking ovens. As described in the text, the inner oven—the one to the right—bakes the primed sheet metal with the conveyor travelling from right to left. At the left is the exit end of the finish baking oven, the painted work coming out to right.



This article is devoted exclusively to the latter operation since the Jeep paint line exemplifies a particularly noteworthy mechanized unit capable of finishing 250 Jeep bodies per eight hour day. Perhaps the most interesting feature of the set-up is its compactness. This is best visualized by examining the line drawing which shows the operation from start to finish as contained in a relatively small floor space area.

The paint shop is located close to the fabrication department where the body structure is assembled on the welding line, followed by metal finishing. The first step in the paint shop is at the big five-stage washing machine where the bodies—mounted on the monorail conveyor — go through the various stages of washing, rinsing, phosphate coating spray, and final rinsing. Upon leaving the washer the conveyor line

Assemblies Remain on Same Conveyor from Time They Are Hung on Hooks in the Metal Finishing Department Until They are Completely Painted and Ready for Transport to the Final Assembly Line

By Joseph Geschelin

Shop Facilities

for Finishing Jeep Bodies

goes through the adjacent dry-off oven.

The conveyor turns at the exit end course to the first spray booth—marked "A" in the illustration—for applying the prime coat. This is a DeVilbiss water back type spray booth of double-unit type to permit the application of primer on both sides.

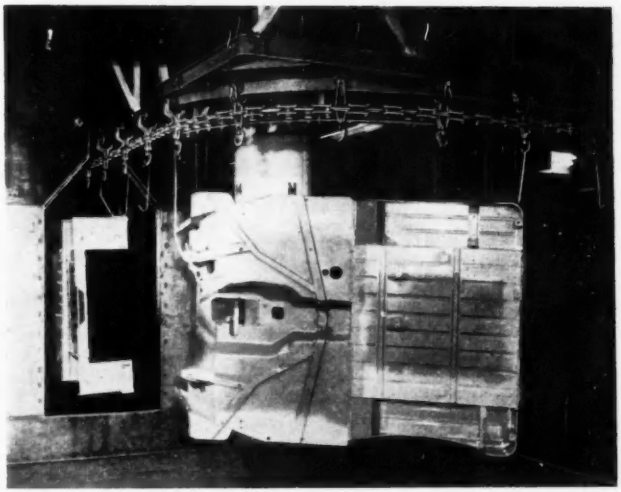
The conveyor turns at the exit end of this spray booth to enter the inner oven of the two parallel drying ovens shown on the drawing. Both ovens were installed by Peters-Dalton of Detroit, each one being 152 ft long. The primer is baked at 325 F for 20 minutes. The conveyor turns again at the exit end of this oven to enter the second bank of DeVilbiss double spray booths. Ahead of this point there is sufficient travel of the conveyor to permit such hand operations as sanding and blow-off of the baked primer.

The second spray booth takes care of the double coating of the final synthetic enamel finish on the inside and outside of the bodies, in the specified color. It may be noted at this point that Jeeps are finished in a range of four colors—gray, olive drab, green, red—or a prime coat where specified. To simplify scheduling, the colors are put through in batches of economic runs.

Leaving the color spray booth the conveyor bends again to enter the outer of the two ovens for baking the color finish. This is done at a temperature of 250 F for 20 minutes.

It is of interest that the two baking ovens, as well as the washer, and dry-off oven at the start of the line, were built and supplied by Peters-Dalton. These

(*Turn to page* 72, *please*)



At the start of the paint shop—Jeep bodies are seen leaving the DeVilbiss primer spray booth at the extreme right and moving on the monorail into the primer oven.

Fuel Spray Nozzles for

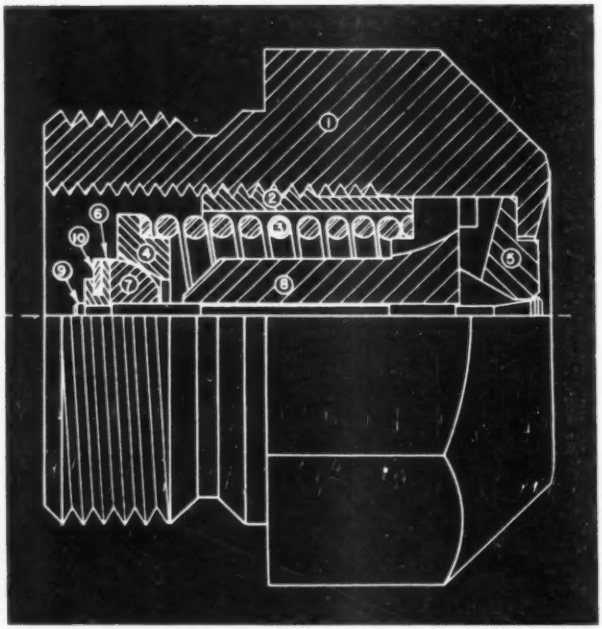


Fig. 1—Variable orifice nozzle. 1—Body. 2—Retainer. 3—Spring. 4—Plate. 5—Orifice plate. 6—Stop collar. 7—Swivel. 8—Guide. 9—Poppet. 10—Retainer ring.

By J. A. Bolt

and M. F. Saxton

Variable Orifice Nozzle

It becomes apparent that what is needed to fulfill the requirements set forth in Part I is an essentially constant pressure variable area nozzle. Theoretically, this would permit the use of some desirable pressure to provide adequate energy for atomization at all flows. However, with this type of nozzle there is no relation between flow and pressure. This implies that the nozzles cannot be used as metering elements to the combustors.

As a compromise between the fixed orifice and the constant pressure types, variable area nozzles have been designed which approximate a linear relationship between pressure and flow. This is accomplished by having the nozzle open at a predetermined pressure and reach the wide open position at some intermediate pressure. Above this pressure the nozzle is a fixed orifice device. By this technique better control can be obtained through the region where the nozzle orifice area is changing.

A nozzle of this type is shown in Fig. 1 and its characteristics in Fig. 2. Photographs of the spray from this nozzle are shown in Fig. 3 and 4 for conditions stated. It is difficult with this type of variable area nozzle to match a group of nozzles for even one engine because of variation in the following:

1. The nozzle flow characteristics which are considerably affected by even small dimensional tolerances of springs and parts.
2. Mechanical friction as it is difficult to control.
3. The fluid coefficients of small annular orifices which are very sensitive to changes in geometry.

With nozzles of this type, having an annular orifice, it must be expected that the paternation will be poor at the lowest flow rate, since it is difficult to maintain adequate concentricity of the poppet valve at the lowest flow.

These nozzles must be made with the best possible precision and finishes. By accepting this principle, and using the best equipment available for manufacturing, it has been possible to make these units without high scrap losses. Their cost will obviously be rather high. However, their advantages in simplicity of the complete fuel system are apparent, and the added cost of this item may be well justified.

The amount of energy that can be stored in a compressible fluid such as air by pressurizing is very large in comparison with that for liquids. Since the breaking up of a liquid fuel requires a considerable amount of energy, the use of compressed air as a source of this energy has many advantages. The use of such secondary fluids has been common in oil burning equipment.

The use of steam for this purpose in oil burning steam generating equipment is at least 50 years old. The Babcock and Wilcox Co. in descriptions of its equipment states that atomization may be secured by

Aircraft Gas Turbines

Part II Discussions of Characteristics of Variable Orifice and Air Atomizing Nozzles Are Presented Here, Followed by Conclusions Reached by the Authors on Nozzle Development. Part I Was Published in May 15 Issue of AUTOMOTIVE INDUSTRIES.

0.1 lb of steam per lb of oil, using steam at 125 psi. Steam, in comparison with compressed air, has the important advantage that it also supplies heat to the oil being atomized. This is very important, since it is generally acknowledged that, in the combustion of liquid fuels, only the vapors burn. Therefore, heat addition is a requirement in preparing any liquid fuel for combustion. The problem is largely one of deciding at what stage heat should be applied.

Compressed air, in contrast to steam, has an undesirable cooling effect due to expansion at the nozzle. This expanded and chilled air is in the most intimate contact with the vaporizing fuel and retards the combustion.

It appears that development of air atomization with its advantages has not been pursued until recently because of the assumption that the necessary air compressor equipment was prohibitive for aircraft application. One suggested manner[1] of using compressed air is to use it in combination with a fixed orifice swirl type nozzle of relatively high capacity. In this plan air is admitted to the spray immediately after leaving the nozzle orifice. Air is supplied at a constant rate for all fuel flows at such a rate as will give satisfactory atomization at the minimum fuel flow rate. Preliminary tests indicate that this can be done with no more than 0.1 lb air per lb fuel, using 20 lb air pressure. With this plan, an I-40 engine would require an air compressor of approximately 1.5 hp.

In doing experimental work with air atomizing nozzles, it has been gratifying to see how much improvement in the low flow sprays can be accomplished with only one psi of air pressure. As the air pressure is reduced, however, the quantity of air must be proportionately increased.

Another great advantage of the use of air is that it permits low fuel pressures and correspondingly larger fuel orifices. Our observations indicate that these nozzles should have little difficulty in passing the size and quantity of dirt in the fuel which is now causing so much trouble on present production installations.

In view of the difficulties being experienced with swirl type atomizers this new, and yet very old, solution should be diligently evaluated.

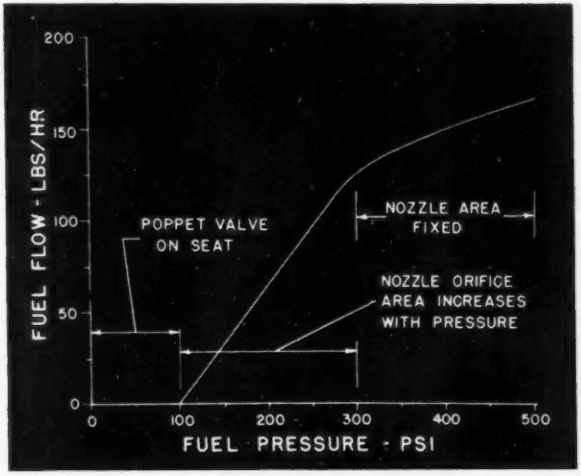


Fig. 2—Characteristics of nozzle with variable area orifice.

Means for Equalizing Nozzle Flow

Up to the present time it has been the practice to require the spray nozzle not only to atomize the issuing fuel, but also

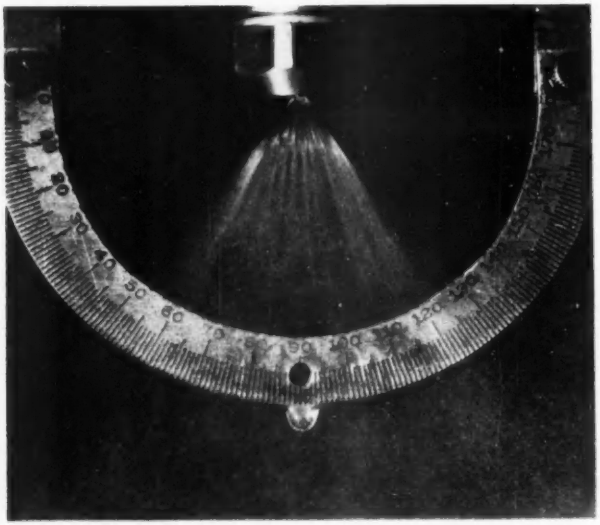


Fig. 3—Nozzle with variable area orifice — 12 lb/hr at 140 psi.

to meter it. This is in sharp contrast to reciprocating engine cylinder injection practice, both with compression and spark ignition engines, where the metering and distributing function is performed by a pump or other control equipment.

The difficulty of making spray nozzles consistent, and the difficulty of matching a set of nozzles in one engine to produce equal flows throughout the range of engine conditions has led to the development of metering devices known as fuel dividers. Their function is to equally sub-divide the fuel to be delivered by the several nozzles, regardless of the pressure versus flow characteristics of these nozzles. Two types of equipment for performing this function have been built, the orifice or flow type divider, and the distributing pump.

The orifice or flow-type divider utilizes a unit which contains a calibrated orifice to meter the fuel to each nozzle. An equal number of pressure regulators maintain equal pressure differential, or metering head, across each of these orifices regardless of the individual nozzle pressure drop. Thus each nozzle is made to deliver an equal flow.

The main objection to the use of a flow-type divider is that it is a rather complex assembly requiring calibrated orifices and regulator components. Its cost may be expected to be quite large.

The distributing pump in some respects presents a more difficult problem than in the case of reciprocating engine practice, because of the requirements of continuous flow. To produce the fuel pressures necessary with present types of nozzles, plunger-type pumps are being investigated. It is necessary to use approximately three plungers to supply each nozzle to obtain satisfactory continuity of spray. An alternative type of flow divider of the pump type is the multi-gear-type pump. All of these pumps have many precision parts. In addition, the cost and weight of some are high.

Conclusions

Up to the present time the problem of selecting or developing a suitable nozzle design for an engine combustor is in an experimental stage. This is perhaps necessarily true because of the many variables involved. It is to be expected, however, that the design of these components can be based on more analytical data as additional fundamental information becomes available on the mechanism of spray, the definition and measurements of sprays, and the factors that influence combustion in a moving air-stream.

A survey of the present practice shows that the duplex type of nozzle is most widely used. This nozzle represents a compromise, in that it extends considerably the flow range of the simple-swirl nozzle, while still maintaining reasonable simplicity and the ability

(*Turn to page 56, please*)

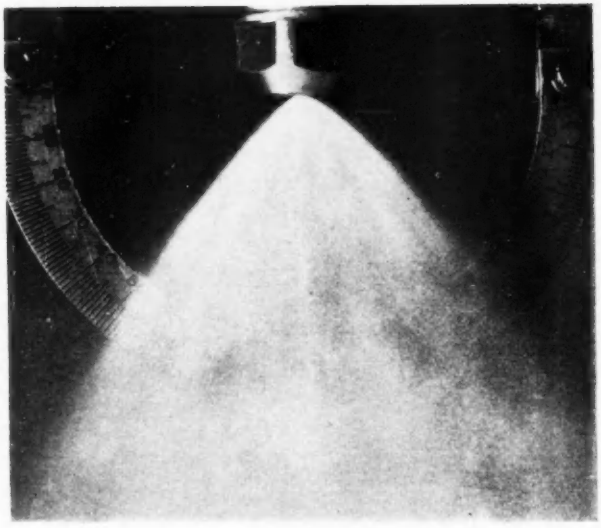


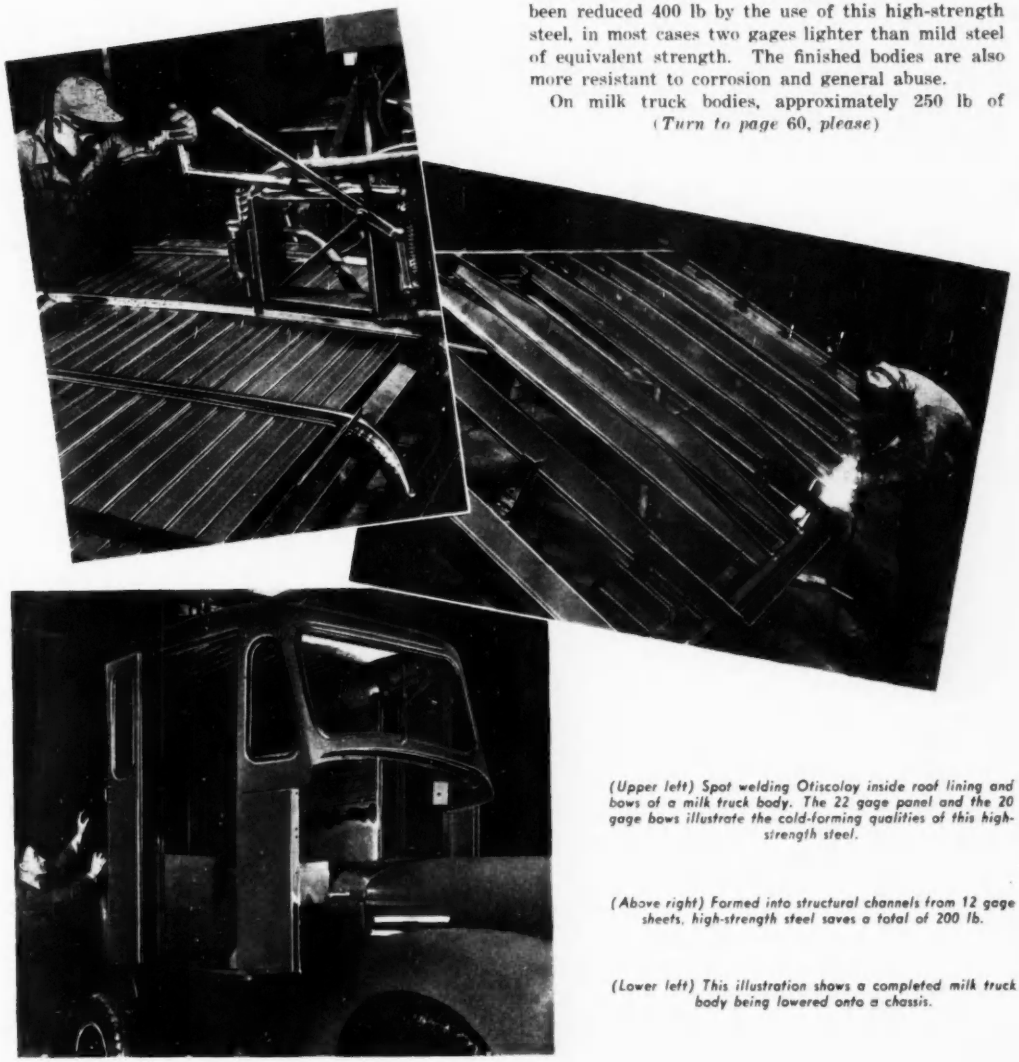
Fig. 4—Variable area nozzle — 160 lb/hr at 400 psi.

Less Truck Weight with High-Strength Steel

ECONOMICAL use of high-strength steel to reduce weight, improve rust-resistance, and withstand abrasive wear, is engineered into the light truck bodies being built by Hughes-Keenan Corp., Delaware, Ohio. First consideration in the use of high-strength steel is the reduction of weight. In a typical parcel delivery model, for example, the total body weight of 2000 lb is made up of 1600 lb of Jones and Laughlin's Otiscoloy high-strength steel, and 400 lb is of drawing quality carbon steel. The weight on this model has been reduced 400 lb by the use of this high-strength steel, in most cases two gages lighter than mild steel of equivalent strength. The finished bodies are also more resistant to corrosion and general abuse.

On milk truck bodies, approximately 250 lb of

(*Turn to page 60, please*)



(Upper left) Spot welding Otiscoloy inside roof lining and bows of a milk truck body. The 22 gage panel and the 20 gage bows illustrate the cold-forming qualities of this high-strength steel.

(Above right) Formed into structural channels from 12 gage sheets, high-strength steel saves a total of 200 lb.

(Lower left) This illustration shows a completed milk truck body being lowered onto a chassis.

236 Industrial Plants

SHOULD emergency industrial mobilization be required tomorrow, the Government has on tap some $2.3 billion worth of industrial plants and facilities which it could call back into war production, according to the tabulations of the Munitions Board. These are 236 war-built plants or portions of plants in the NIR (National Industrial Reserve). All are either still in the hands of the Government, under control of the military establishment, or are being privately operated under sales or lease agreements subject to the NSC (National Security Clause).

Three of the 15 general classifications—aircraft and components, shipbuilding, and explosives and ammunition loading—account for nearly half the facilities which could be called back for war production. The reason for this top-heavy grouping is two-fold. It is partly because of their importance to war production and partly to prevent such complete conversion to non-military purposes that their rapid mobilization value would be lost.

For instance, most NSC plants could be reconverted in 120 days or even much less. In the instance of an aluminum plant not subject to this restriction, it is estimated that nine months or more would be required for conversion to war production.

Need for rapid expansion of the aircraft industry during World War II made it necessary for the Government to foot about 90 per cent of the bill. In the case of about 290 plants, most of the expenditure was for expansion of floor space and additional equipment and machinery. In 60 or more cases, conversion of plants and buildings to aircraft production was in-

Status of Selected Production Facilities National

FACILITY	STATUS	FACILITY	STATUS
Aviation Corp. (Republic Aircraft Products Div.) Detroit, Mich. $494,000 Product — Aircraft Engine Parts Air Force*	Sold October 1948 to Federal Motor Truck Co. subject to NSC.	Jacobs Aircraft and Engine Co. (Firestone Tire & Rubber Co.) Pottstown, Pa. $10,220,000 Product—Aircraft engines Air Force*	Leased to Firestone through January 1953, with purchase option. If purchase option not exercised, NSC to be applied on land, buildings and non-severable equipment.
Chrysler Corporation Chicago, Ill. $67,727,000 Product—Aircraft engines Air Force*	Leased to Tucker Corp. to October 1957 with option to purchase. If purchase option not exercised, NSC to be applied on land, buildings, and non-severable equipment at expiration of existing lease.	Lockheed Aircraft Corp. Van Nuys, Calif. $3,458,000 Product—Aircraft modification and repair Navy*	Sold to City of Van Nuys, Calif. as airport property with NSC.
Curtiss-Wright Corp. Louisville, Ky. $13,944,000 Product—Airframes Navy*	Sold March 1946 to International Harvester Co. under modified NSC.	Martin Co., Glenn L. Baltimore, Md. $2,217,000 Product—Airplanes Navy*	Non-surplus. In production (Held by Department of Navy).
Fairchild Engine and Airplane Corp. (Ranger Aircraft Div.) Farmingdale, N. Y. $6,137,000 Product—Aircraft engines and parts Navy*	Surplus.	McDonnell Aircraft Corp. (South Portion) St. Louis, Mo. $10,238,000 Product—Aircraft Navy*	Sold to City of St. Louis in March 1947, subject to NSC for two years from date of sale.
General Motors Corp. (Chevrolet Div.) Plant No. 1 Tonawanda, N. Y. $8,784,000 Product-Aircraft engines Air Force*	Sold to Playboy Motor Co. January 1948, subject to NSC on land and buildings only.	Northwestern Aeronautics Corp. St. Paul, Minn. $882,000 Product—Aircraft (Gliders) Navy*	Leased to March 1951 to Engineering Research Associates, Inc.
Globe Aircraft Corp. Fort Worth, Texas $638,000 Product-Aircraft Navy*	Portion surplus. Portion occupied under interim use permit by U. S. Treasury Department for warehousing purposes. Airport portion, non-surplus.	Studebaker Corp. South Bend, Ind. $50,130,000 Product—Aircraft engines Air Force*	Sold October 1947 to Studebaker Corp. subject to modified NSC on land and buildings only.
		United Aircraft Corp. (Chance Vought Aircraft Div.) Stratford, Conn. $3,151,000 Product—Airplanes Navy*	Surplus. Part under interim lease to September 1948 to United Aircraft Service Corp. Part (approximately half) sold June 1947 to contractor by Navy, with NSC.

Available for War Production

By Karl Rannells
Washington Bureau, Automotive Industries

volved. Three-fourths of the total Government investment was tied up in 61 plants, however. These were 39 airframe, 15 engine, and seven parts and accessories plants which cost $5 million or more each. In the rush to dispose of war surpluses, 34 were sold before the National Industrial Reserve was set up, but the remainder are now part of the NIR.

Those now a part of the reserve include 11 airframe plants, nine engine plants, and 21 parts and accessories facilities. Sold to commercial operators under the security provision are four airframe, four engine, and eight parts plants. Also under the NSC, but in operation under leasing agreements, are three airframe, one engine, and 10 parts-making plants.

Under terms of the NSC, the scope of the provision goes much farther than the generally accepted definition that the Government can recapture the plant on the occasion of a national emergency. A major factor in the security clause requires the buyer or lessee to maintain plant structures in good condition for as much as 20 years and reserve equipment up to 10 years. Negligence could result in the Government taking over and restoring plant and operating equipment.

Thus, it can be assumed that the 30 plants in active

Industrial Plant Reserve (March, 1949)

FACILITY	STATUS	FACILITY	STATUS
Waco Aircraft Co. Troy, Ohio $739,000 Product—Aircraft Air Force*	Leased to B. F. Goodrich to August 1951 with five-year renewal and option to purchase.	Southern Aircraft Corp. Garland, Texas $1,245,000 Product—Gun turrets, bomb-bays control surfaces Navy*	Leased to March 1951 to Southern Aircraft Corp. with option to purchase.
Wright Aeronautical Corp. East Paterson, N. J. $3,945,000 Product—Aircraft engines Air Force*	Sold to Allen B. Dumont Lab. Inc., October 1948, subject to modified NSC on land and buildings.	Solar Aircraft Co. Des Moines, Iowa $1,681,000 Product — Exhaust manifolds Air Force*	Sold to Solar Aircraft Corp. subject to NSC.
Wright Aeronautical Corp. Lockland, Ohio $56,300,000 Product—Aircraft engines Air Force*	All except three foundries sold December 1947 to Electric Auto-Lite Co., subject to modified NSC on land and buildings only. Three foundries transferred to Department of Air Force for war reserve retention, October 1948.	Smith Corp., A. O. Milwaukee, Wis. $2,125,000 Product—Landing gear Air Force*	Leased to General Motors Corp. (A. C. Spark Plug Div.) to September 1953, subject to NSC.
		Sealed Power Corp. Muskegon, Mich. $593,000 Product—Piston rings (aircraft) Air Force*	Sold June 1948 to Sealed Power Corp. subject to NSC. Parking lot (not subject to NSC) sold January 1949 to Sealed Power Corp.
Vickers, Inc. Detroit, Mich. $9,865,000 Product—Hydraulic equipment for aircraft gun turrets Navy*	Sold July 1948 to state of Michigan for National Guard use, subject to modified NSC.	Rohr Aircraft Corp. Chula Vista, Calif. $1,946,000 Product — Aircraft assemblies; bomb racks and bomb-bay doors Navy*	Leased to Rohr to January 1954, subject to NSC on land and buildings only. Cafeteria and warehouse areas sold July 1946. Hangar and seaplane ramp in surplus inventory.
Studebaker Corp. Chicago, Ill. $25,318,000 Product—Aircraft engine parts Air Force*	Sold December 1948 to National Tea Co., subject to NSC, and subject to lease to Western Electric Co. to December 1950.	Remington-Rand, Inc. Johnson City, N. Y. $4,905,000 Product — Aircraft propellers Air Force*	Leased to General Electric Co. to November 1953, subject to NSC, with five-year renewal option.
Sperry Gyroscope Co., Inc. Great Neck, L. I., N. Y. $19,000,000 Product—Aircraft parts Navy*	Portion leased to United Nations through June 1949. Remainder leased to Sperry Gyroscope Co. through August 1949, with renewal option to extend to August 1951, and option to purchase entire plant.	Pullman Standard Car Manufacturing Co. Chicago, Illinois $5,495,000 Product—Aircraft sub-assemblies (wings, tails, etc.) Navy*	Leased to General Motors to December 1951 with renewal options extending to December 1956, and option to purchase.

operation will be maintained in suitable condition for rapid conversion in an emergency. The Munitions Board recommends that the remaining 11 inactive plants—four airframe, four engine, and three parts—should be disposed of only under the NSC or else maintained as standby plants, properly maintained for fast activation.

The situation is somewhat different in regard to tank and allied equipment plants. Most expansion was privately financed, although the Government put considerable funds into the Detroit Tank Arsenal. Lima Ordnance Plant, the Flint (General Motors) Tank Assembly, and the Renton (Pacific Car & Foundry) Tank Plant. Also, the Government money backed a number of plants for manufacture of tank armor, axles and transmission cases, tank guns, gun mountings, etc. Practically all of these have been retained in the NIR.

Of the six plants in the tank section of the reserve, the Lima plant is the only facility remaining for manufacture of tanks. However, the GM plant at Grand Blanc is reserved for quick conversion to tank and gun carriage production.

While the automobile industry has completely reconverted to commercial production, the Board considers it one of the lesser problems should industrial mobilization ever become necessary. In such an event, procedure of 1942 would be followed—turning all facilities into production of military vehicles such as would be prescribed by a new WPB, authorized under the plans being developed by the NSRB (National Security Resources Board).

For the support of aircraft production, there are two alumina plants in operation with a combined capacity of 2.5 billion lb annually, seven aluminum reduction plants with a combined designed capacity of 1.1 billion lb per year. However, since some of the reduction plants have been cannibalized, the total potential capacity is only about 828 million lb, of which about 432 million lb was in operation as of

Status of Selected Production Facilities National

FACILITY	STATUS
Pesco Products Co. Cleveland, Ohio $1,852,000 Product — Accessories for airplane engines Navy*	Sold February 1949 to Midland Cotton Products Co., subject to NSC.
Menasco Manufacturing Co. Burbank, Calif. $1,866,000 Product — Aircraft landing gear struts Air Force*	Leased to June 1951 to Menasco, subject to NSC, with two-year renewal option and option to purchase.
Jack & Heintz, Inc. Bedford, Ohio $2,800,000 Product—Aircraft automatic pilots and flight instruments Navy*	Leased to Jack & Heintz through February 1951, with purchase option.
Jack & Heintz, Inc. Bedford, Ohio $1,488,000 Product — Gyro-flight instruments Navy*	Leased to Jack & Heintz through February 1951, with purchase option.
Goodyear Aircraft Corp. Litchfield Park, Ariz. $8,907,000 Product—Aircraft parts Navy*	Airport portion transferred to Navy, February 1948. Remainder sold January 1949 to Goodyear Aircraft Corp., subject to NSC.
Ford Motor Co. Willow Run, Mich. $58,870 Product—Bombers and subassemblies Air Force*	Water and sewerage disposal facilities sold to city of Ypsilanti. Thirteen temporary buildings, heating equipment and railroad trackage sold to Kaiser-Fraser without NSC. Remainder sold December 1948 to Kaiser-Fraser Corp. subject to NSC on land, buildings and non-severable equipment.
Eaton Manufacturing Co. Cleveland, Ohio $7,753,000 Product—Crank shafts for aircraft engines Navy*	Sold to Gabriel Corp. in September 1948, subject to NSC.
Eaton Manufacturing Co. Saginaw, Mich. $4,803,000 Product — Aircraft engine parts Navy*	Sold to Eaton Mfg. Co. in October 1948, subject to NSC. Portion sold to Eaton Mfg. Co. prior to application of NSC.
Douglas Aircraft Corp. El Segundo, Calif. $981,000 Product—Aircraft Navy*	Transferred to FWA without reimbursement.
Curtiss-Wright Corp. Kenmore, N. Y. $3,552,000 Product—Aircraft Air Force*	Surplus. Used by WAA for warehouse purposes.
Consolidated Vultee Aircraft Corp. New Orleans, La. $8,499,000 Product—Aircraft Navy*	Sold October 1948 to American Radiator Co., subject to modified NSC.
Continental Aviation and Engineering Corp. Muskegon, Mich. $5,273,000 Product—Aircraft engines Air Force*	Surplus. Portions under interim lease; portions in use for WAA warehouse purposes. NSC to be applied on land, buildings and non-severable equipment.
Columbia Aircraft Corp. (Aircraft Service Corp.) Valley Stream, L. I., N. Y. $1,320,000 Product—Aircraft and parts Navy*	Leased to East Coast Aeronautics, Inc., through December 1953, subject to NSC.

March 1. Another 72 million lb will be placed into operation before the end of the year.

Two sheet plants with a productive potential of 576 million lb annually are operating at capacity under NSC leases. Five extrusion and tube plants had designed capacities totaling nearly 160 million lb but considerable potential is in disuse. Other aluminum capacity included 100 million lb of forgings and 150 million lb of wire, rod and bar.

While the military is apparently getting all its needs in the way of aluminum, it is estimated currently that production in 1949 may fall short of civilian requirements by as much as 300 million to 600 million lb. However, a weakening of the markets could quickly change the picture.

Also, while the Aluminum Co. of America lost 40 million lb of capacity with the permanent closing of its Niagara Falls works, it has an additional 114 million lb new output under construction at Point Comfort, Texas. About 38 million lb will come into production next November and the remainder during the first half 1950.

Some of these aluminum plants were sold or leased before initiation of the security clause. Any such purchased plants could possibly be converted to other production without restriction. However, at least a dozen others are subject to the maintenance and recapture provisions and are in the plant reserve.

Of equal importance with the plant reserve is the tool reserve also authorized under Public Law 883. This provides, exclusive of JANMAT (Joint Army-Navy Machine Tool), for the setting aside or earmarking machine tools and other production equipment which could be used for industrial mobilization.

Originally, the MB had hoped to locate and store at least 50,000 items and had FWA (Federal Works Agency) arrange storage at Gary, Buffalo and Riverbank. This goal now seems overly optimistic. As of March 1, some 7685 items had been shipped and an-

(*Turn to page 72, please*)

Industrial Plant Reserve (March, 1949)—*Continued*

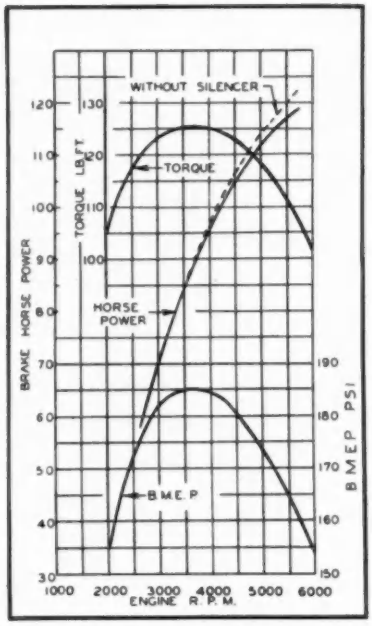
FACILITY	STATUS
Boeing Aircraft Corp. Renton, Wash. $11,980,000 Product—Aircraft assembly Air Force*	Surplus. Portion leased to multiple tenancy project; portion under interim lease. NSC to be applied to land, buildings, and non-severable equipment upon expiration of existing leases.
Bendix Aviation Corp. South Bend, Ind. $615,000 Product — Gun turrets for airplanes Navy*	Sold August 1948 to Bendix Aviation Corp., subject to NSC.
Bendix Aviation Corp. South Bend, Ind. $12,875,000 Product—Gun turrets, starters, generators and instruments for aircraft Navy*	Sold August 1948 to Bendix Aviation Corp., subject to NSC.
Bechtel-McCone-Parsons Birmingham, Ala. $15,241,000 Product — Airplane Modification Center Air Force*	Sold August 1948 to city of Birmingham as airport property, subject to modified NSC.
Aluminum Co. of America Kansas City, Mo. $4,984,000 Product—Cylinder heads for aircraft engines Navy*	Leased to Vendo Co. to April 1956, with option to purchase extending to October 1950.
General Motors Corp. (Fisher Body Div.) Grand Blanc (Flint) Mich. $25,000,000 Product — Tank and gun motor carriages Army*	Major portion leased through March 1951 to General Motors with five-year renewal option and option to purchase entire plancor (including unleased vacant land) subject to NSC on land, buildings and building installations.
Lima Tank Arsenal Lima, Ohio $1,169,000 Product—Medium tanks Army*	Sold July 1948 to the Lima-Hamilton Corp. (successor to Lima Loco. Works), subject to NSC for five years.
Pacific Car & Foundry Co. Renton, Wash. $5,610,000 Product—Armor steel castings and tanks Army*	Surplus. Under interim lease to Pacific Car & Foundry Co.
Standard Steel Spring Co. Madison, Ill. $23,025,000 Product — Rear axles for motor vehicles Air Force*	Leased to Western Reserve Steel Corp., subject to NSC to January, 1954, with five-year renewal option and option to purchase, subject to NSC. Off-site electric power equipment released from NSC restrictions in February 1949.
Sundstrand Machine Tool Co. Rockford, Ill. $427,000 Product—Hydraulic equipment for gun turrets Air Force*	Sold August 1948 to Sundstrand, subject to NSC.
Timken Detroit Axle Co. Detroit, Mich. $3,671,000 Product—Axles and transfer cases Army*	Leased to Timken Detroit Axle Co. through April 1949, with option to purchase.
Timken Roller Bearing Co. Columbus, Ohio $1,217,000 Product — Tapered roller bearings Air Force*	Sold September 1947 to Timken Roller Bearing Co., subject to modified NSC.
American Tool Works Co. Cincinnati, Ohio $1,816,000 Product—Machine tools Navy*	Sold February 1948 to American Tool Works Co., subject to NSC.

*—Sponsor in National Industrial Reserve

SOURCE: Munitions Board.

Note: War-built facilities in the above list include those of the 236 in the industrial reserve which are of major interest to the automobile and aviation industries. In a number of instances, the facilities listed above include only portions of the original plant and/or equipment. Also, valuation figures represent only the original cost of such portions of plants as are included in the reserve.

Lea-Francis Engine for

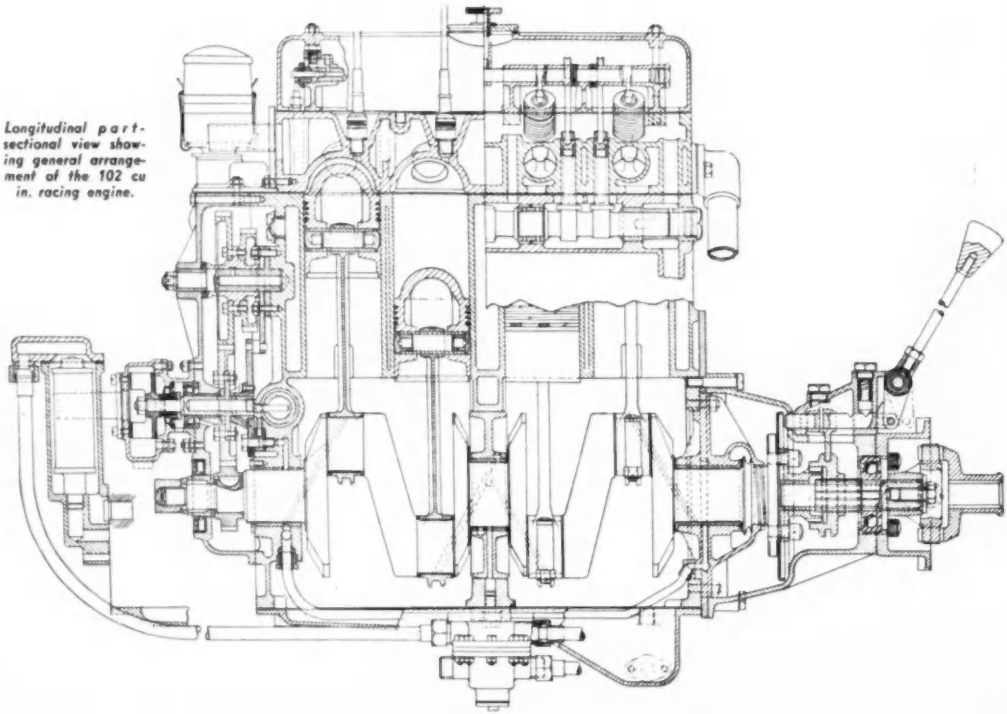


Typical performance curves of the Lea-Francis 102 cu in. racing engine with 14 to one compression ratio, using fuel consisting of 89 per cent methanol, 10 per cent benzol, and one per cent castor oil.

DISTINCTIVE among British sports cars is the Lea-Francis, featuring engines with two "high" camshafts operating inclined valves through short push rods and rocker arms. The line of engines comprises three stock models with four cylinders having piston displacements of 91.29 and 107.8 cu in. Two of these are built as sports jobs, and one is conventional.

The four-cylinder 107.8 cu in. sports model has a bore and stroke of 2.95 in. by 3.94 in., and with a compression ratio of 8 to 1, develops its maximum output of 87 hp at 5200 rpm. Maximum torque is 114 lb-ft at 3500 rpm and maximum bmep is 159.4 at the same speed. Cylinders and crankcases are an iron casting, with a separate cast iron head carrying intake and exhaust valves inclined at 45 deg. Valve operation is by push rods and rockers, but the "high" camshafts reduce the length of the push rods to 2½ in. while the hollow chilled cast iron tappets, carried in the head, have an overall length of three in. The design gives a completely

Longitudinal part-sectional view showing general arrangement of the 102 cu in. racing engine.

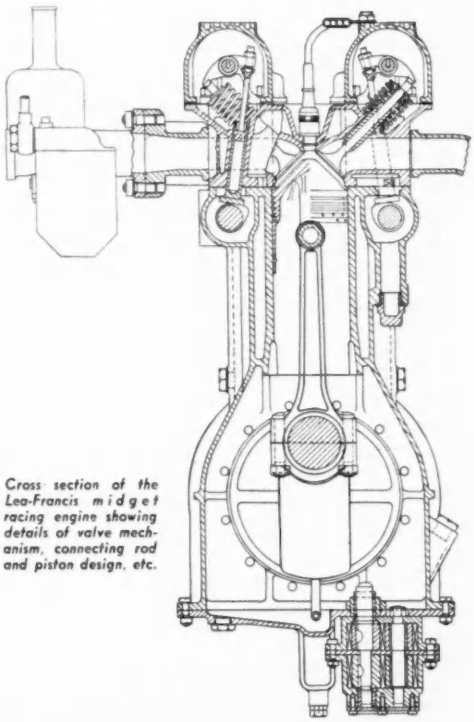


Midget Racing U. S. Competition

By W. F. Bradley
Special European Correspondent of
AUTOMOTIVE INDUSTRIES

hemispheric combustion chamber, with valve ports of 1 5/16 in. diameter, the 14 mm. spark plugs being mounted vertically slightly off center. A double roller chain, with an automatic tensioning device, is used for the camshaft drive. The counterbalanced camshaft is carried in three main bearings, the center one having a diameter of 2½ in and the outer ones measuring 2 in. diameter. Three bearings are used for each camshaft.

Connecting rods are H-section alloy steel, with cast-in bearings. Aluminum alloy split-skirt pistons are used, with two compression rings and one oil ring. Valve timing is 18 deg btc and 74 deg abc for the intake, and 57 deg bbc and 23 deg atc for the exhaust. Lubrication follows normal lines, with 12 pints of oil carried in the aluminum oil pan and direct pressure feed to main and connecting rod bearings, valve gear and timing chain. Two S.U. horizontal carburetors are standard equipment.



Cross section of the Lea-Francis midget racing engine showing details of valve mechanism, connecting rod and piston design, etc.

This design lends itself readily to converstion to racing practice, and a modified Lea-Francis of 102 cu in. piston displacement is now being produced and sold in the United States for midget racing. The reduced piston displacement has been obtained by changing the cylinder bore to 2.875 in., the stroke remaining at 3.937 in. The crankshaft for the racing job is of alloy steel accurately machined and balanced, carried in three main bearings of the same diameters as those in the sports model. Lengths are 2 in. for the front, 1 7/16 in. for the center, and 2⅝ in for the rear. Crank pins are 1⅜ long by 2 in. diameter. The connecting rods are special high tensile steel, machined, polished and balanced, with cast-in bearings.

Compression ratio is increased to 13-1 by the use of high-domed aluminum alloy pistons. There are three wide compression rings and one oil ring. Piston pins are full floating, with end pads.

Fuel usually employed for this high compression ratio is 89 per cent methanol, 10 per cent benzol and 1 per cent castor oil.

Important among the changes for racing use is the adoption of spur gears and pinions in place of chain for camshaft drive; there are six gears, all with straight cut teeth. Combustion chambers are machined to nearly perfect hemispheres and both intake and exhaust valve ports are polished. Dry sump lubrication is used, the scavenger pump having 25 per cent greater capacity than the pressure pump. An Amal carburetor is fitted to each cylinder, size being 1 1/16 in. Alternatively, two twin S.U. carburetors can be supplied. Ignition can be either by Lucas distributor and coil, with current supplied by dry cells to save the weight of a storage battery and generator, or by a magneto.

For midget auto racing, a dog clutch only is incorporated, without a flywheel, but for other forms of racing a lightened flywheel with a specially prepared clutch and a four-speed synchromesh transmission is available.

The 102 cu in. racing engine is stated to develop a maximum of 125 hp at approximately 6000 rpm. The power curve shows a maximum of 120 at 5900 rpm, with muffler fitted, a maximum torque of 125 lb-ft at 3500 rpm. Valve timing for these tests was the same as for the sports model with the exception of exhaust opening which was 69 deg bbc. Two H4 S.U. carburetors were used.

Current Passenger Car Price, Weight and Body Table

Following are prices at factory for cars with standard equipment as of May 7, 1949. State or local taxes, transportation and finance charges and optional equipment are extra.

BODY MAKE AND MODEL	List Price at Factory without Federal Taxes	Federal Taxes and Handling Charges	Delivered Price at Factory including Federal Taxes	Shipping Weight
BUICK				
Super 50				
Sedanet	1829	146	2075	3735
Sedan, 4d	2023	151	2174	3835
Conv. Coupe	2430	173	2603	3965
Est. Wagon	3000	203	3203	4100
R'dmaster 70				
Sedanet	2450	189	2639	4115
Sedan, 4d	2563	195	2758	4205
Conv. Coupe	2960	216	3176	4370
Est. Wagon	3520	245	3765	4490
CADILLAC				
Series 61				
Club Coupe, 2d	2640	174	2814	3880
Tour. Sedan, 4d.	2740	179	2919	3950
Series 62				
Club Coupe, 2d	2810	182	2992	3910
Tour. Sedan, 4d.	2890	186	3076	3980
Conv. Coupe, 2d	3315	208	3523	4230
Series 60				
Tour. Sedan, 4d.	3625	234	3859	4150
Series 75				
Bus. Sedan, 9p.	4405	286	4691	
Tour. Sedan, 4d.	4500	291	4791	4665
Bus. Imp., 9p	4585	295	4880	
Sedan, 7p	4710	301	5011	4685
Imperial, 7p	4900	311	5211	4720
CHEVROLET				
Styleline GJ				
Bus. Coupe	1260	90	1350	3000
Sedan, 2d	1330	94	1424	3035
Spt. Coupe	1335	94	1429	3010
Sedan, 4d	1375	96	1471	3075
Fl'tline GJ				
Sedan, 2d.	1330	94	1424	3065
Sedan, 4d.	1375	96	1471	3085
Styleline GK				
Sedan, 2d.	1405	98	1503	3080
Spt. Coupe	1420	99	1519	3055
Sedan, 4d.	1450	100	1550	3125
Conv. Coupe	1750	118	1868	3355
Sta.Wag.,Wood	2140	138	2278	3500
Sta.,Wag.,Steel	2140	138	2278	3450
Fl'tline GK				
Sedan, 2d	1405	98	1503	3090
Sedan, 4d.	1450	100	1550	3115
CHRYSLER				
Royal 6				
Club Coupe	2002	112	2114	3531
Sedan, 4d, 6p	2021	113	2134	3571
Sedan, 4d, 8p				
Limousine, 8p				
Sta. Wagon, 9p				
Windsor 6				
Club Coupe	2186	122	2308	3631
Sedan, 4d, 6p	2206	123	2329	3681
Conv. Coupe	2598	143	2741	3845
Sedan, 4d, 8p				
Limousine				
Saratoga 8				
Club Coupe	2448	136	2584	4037
Sedan, 4d, 6p	2473	137	2610	4103
New Yorker 8				
Club Coupe	2558	142	2700	4048
Sedan, 4d, 8p	2583	143	2726	4113
Conv. Coupe	3039	167	3206	4277
Twn. and Cty. 8				
Conv. Coupe				
Crown Imp.				
Sedan, 4d, 8p				
Limousine, 8p				
CROSLEY				
Sedan, 2d	888			1115
Convertible	949			1110
Sta. Wagon				
DE SOTO				
De Luxe				
Club Coupe	1871	105	1976	3455
Sedan, 4d	1881	105	1986	3520
DE SOTO (Continued)				
Sta. Wagon				
Carry-All				
Custom				
Club Coupe	2042	114	2156	3585
Sedan, 4d, 6p	2059	115	2174	3645
Convertible	2443	135	2578	3785
Sedan, 8p				
Suburban				
DODGE				
Wayfarer, D29				
Coupe, 3p	1525	86	1611	3065
Roadster, 3p	1635	92	1727	3130
Sedan, 2d				3180
Meadowb'k D30				
Sedan, 4d	1750	98	1848	3355
Coronet D30				
Club Coupe	1812	102	1914	3325
Sedan, 4d	1825	102	1927	3380
Twn. Sedan	1905	107	2012	3390
Conv. Coupe	2206	123	2329	
Sta. Wagon				
Sedan, 7p				
FORD				
Six				
Bus. Coupe	1236	97	1333	2871
Tudor	1323	102	1425	2945
Fordor	1368	104	1472	2990
Custom 6				
Tudor	1405	106	1511	2948
Club Coupe	1405	106	1511	2928
Fordor	1450	109	1559	2993
Eight				
Bus. Coupe	1318	102	1420	2911
Tudor	1393	106	1499	2985
Fordor	1438	108	1546	3030
Custom 8				
Tudor	1480	110	1590	2968
Club Coupe	1485	111	1596	2968
Fordor	1525	113	1638	3033
Conv. Coupe	1820	129	1949	3274
Sta. Wagon	2118	146	2264	3563
FRAZER				
Sedan	2264	131	2395	3455
Manhattan	2446	149	2595	3514
HUDSON				
Super 6				
Coupe, 3p	1915	138	2053	3460
Brougham	2013	143	2156	3470
Club Coupe	2058	145	2203	3480
Sedan, 4d	2061	146	2207	3500
Conv. Brghm.	2623	176	2799	
Commodore 6				
Club Coupe	2205	154	2359	3550
Sedan, 4d	2228	155	2383	3540
Conv. Brghm.	2768	184	2952	
Super 8				
Brougham	2093	152	2245	
Club Coupe	2138	154	2292	3495
Sedan, 4d	2141	155	2296	3525
Commodore 8				
Club Coupe	2285	163	2448	3570
Sedan, 4d	2308	164	2472	3600
Conv. Brghm.	2848	193	3041	
KAISER				
Special	1869	126	1995	3345
Traveler	1958	130	2088	
De Luxe	2064	131	2195	3400
Virginian	2826	169	2995	
LINCOLN				
Coupe, 6p	2350	177	2527	3959
Spt. Sedan, 4d.	2395	180	2575	4009
Convertible	2910	206	3116	4224
Cosmopolitan				
Coupe	2975	210	3185	4194
Twn. Sedan	3025	213	3238	4274
Spt. Sedan	3025	213	3238	4259
Convertible, 6p	3700	248	3948	4419
MERCURY				
Coupe, 6p	1845	134	1979	3321
Spt. Sedan, 4d	1895	136	2031	3386
Convertible, 6p	2255	155	2410	3591
Sta. Wagon	2545	171	2716	3626
NASH				
600 Super				
Sedan, 2d	1668	118	1786	2935
Brougham, 2d	1690	118	1808	2960
Sedan, 4d	1693	118	1811	2950
600 Sup. Spec.				
Sedan, 2d	1703	121	1824	2935
Brougham, 2d	1725	121	1846	2960
Sedan, 4d	1728	121	1849	2950
600 Custom				
Sedan, 4d	1873	127	2000	2985
Amb. Super.				
Sedan, 2d	2029	141	2170	3365
Brougham, 2d	2050	141	2191	3390
Sedan, 4d	2054	141	2195	3385
Amb. Sup. Sp.				
Sedan, 2d	2074	144	2218	3365
Brougham, 2d	2095	144	2239	3390
Sedan, 4d	2099	144	2243	3385
Amb. Cust.				
Sedan, 2d	2189	149	2338	3400
Brougham	2210	149	2359	3415
Sedan, 4d	2214	149	2363	3415
OLDSMOBILE				
Series 76-6				
Club Coupe	1630	118	1748	3260
Club Sedan	1655	119	1774	3290
Twn. Sedan	1715	122	1837	3335
Sedan	1725	123	1848	3340
Club Cpe., DeL	1765	124	1889	3315
Club Sed., DeL.	1790	126	1916	3355
Twn. Sed., DeL.	1850	129	1979	3400
Sedan, DeL.	1860	130	1990	3375
Conv. Coupe	2025	139	2164	3580
Sta. Wag., DeL.	2735	176	2911	3680
Series 88-8				
Club Coupe	2025	139	2164	3550
Club Sedan	2050	141	2191	3585
Twn. Sedan	2110	144	2254	3625
Sedan	2120	145	2265	3615
Club Cpe., DeL	2150	145	2295	3590
Club Sed., DeL.	2175	147	2322	3615
Twn. Sed., DeL.	2235	150	2385	3665
Sedan, DeL.	2245	151	2396	3645
Conv. Coupe	2420	160	2580	3845
Sta. Wag., DeL.	3120	197	3317	3945
Series 98-8				
Club Sedan	2290	157	2447	3835
Sedan	2360	161	2521	3890
Club Sed., DeL.	2380	161	2541	3840
Sedan, DeL.	2450	165	2615	3925
Conv. Cpe., DeL	2810	184	2994	4200
PACKARD				
Eight				
Club Sed., 2d	2094	130	2224	3740
Tour. Sed., 4d	2118	131	2249	3815
Conv. Vict.	3154	196	3350	4260
DeL. Cb. Sed.	2721	173	2894	3855
DeL. Tr. Sed.	2745	174	2919	3925
Conv. Vict.	3154	196	3350	4260
DeL. Sedan, 7p	3724	226	3950	4600
DeL. Limous.	3867	233	4100	4620
Custom 8				
Tour. Sed., 4d	*3522	218	*3750	4200
Convert. Vict.	*4051	244	*4295	4435
PLYMOUTH				
DeLuxe-P17				
Coupe, 3p	1295	76	1371	2825
PLYMOUTH (Continued)				
Sedan, 2d				
Suburban	1740	100	1840	3105
DeLuxe-P18				
Club Coupe	1435	84	1519	3034
Sedan, 4d	1465	86	1551	3059
Spec. DeL.-P18				
Club Coupe	1515	88	1603	3046
Sedan, 4d	1540	89	1629	3079
Conv. Cb. Cpe.	1875	107	1982	3323
Sta. Wagon	2245	127	2372	3341
PONTIAC				
Chieft.-6				
Bus. Coupe	1492	111	1603	3185
Sed. Coupe	1609	117	1726	3225
Sedan, 2d	1609	117	1726	3245
Sedan, 4d	1657	119	1776	3275
DeL. Sed. Cpe.	1699	122	1821	3230
DeL. Sed., 2d	1699	122	1821	3260
DeL. Sed., 4d	1747	124	1871	3290
DeL. Conv. Cpe.	2015	138	2153	3485
Streaml. 6				
Sed. Coupe	1589	116	1705	3260
Sedan, 4d	1637	118	1755	3270
DeL. Sed. Cpe.	1679	121	1800	3270
DeL. Sedan, 4d.	1727	123	1850	3315
Sta. Wag. 6				
Wood	2400	159	2559	3680
Metal	2400	159	2559	3540
DeL. Wood	2475	163	2638	3640
DeL. Metal	2475	163	2638	3490
Chieft. 8				
Bus. Coupe	1557	114	1671	3240
Sed. Coupe	1674	120	1794	3285
Sedan, 2d	1674	120	1794	3315
Sedan, 4d	1722	122	1844	3360
DeL. Sed. Cpe.	1764	125	1889	3300
DeL. Sedan, 2d.	1764	125	1889	3325
DeL. Sedan, 4d.	1812	127	1939	3380
DeL. Conv. Cpe.	2080	141	2221	3560
Streaml. 8				
Sed. Coupe	1654	119	1773	3315
Sedan, 4d.	1702	122	1824	3360
DeL. Sed. Cpe.	1744	124	1868	3340
DeL. Sed., 4d	1792	127	1919	3380
Sta. Wag. 8				
Wood	2465	162	2627	3740
Metal	2465	162	2627	3605
DeL. Wood	2540	166	2706	3695
DeL. Metal	2540	166	2706	3550
STUDEBAKER				
Champ. DeL.				
Coupe, 3p	1482	106	1588	2590
Sedan, 2d	1547	110	1657	2675
Coupe, 5p	1572	111	1683	2670
Sedan, 4d	1577	112	1689	2720
Ch. Reg. DeL.				
Coupe, 3p	1552	110	1662	2615
Sedan, 2d	1617	114	1731	2685
Coupe, 5p	1642	115	1757	2690
Sedan, 4d	1647	115	1762	2725
Convertible	1955	131	2086	2885
Commdr.				
Coupe, 3p	1792	127	1919	
Se.dan, 2d	1857	131	1988	3165
Coupe, 5p	1882	132	2014	3150
Sedan, 4d	1887	132	2019	3195
Com. Reg. DeL.				
Coupe, 3p	1907	134	2041	
Sedan, 2d	1972	137	2109	3175
Coupe, 5p	1997	138	2135	3165
Sedan, 4d	2002	139	2141	3215
Land Cruis.	2180	148	2328	3280
Convertible	2313	155	2468	3385
WILLYS				
Jeepster	1495	107	1602	2468
Sta. Wag., 4 cyl.	1595	186	1781	2587
Sta. Wag., 6 cyl.	1695	119	1814	2845
Sta. Wag., 6 cyl.	1745	121	1866	

• Excluding Ultramatic transmission which is priced at $225.

B-102—Milling and Centering Machine

Continuous rough and finish milling and centering of work pieces simultaneously on both ends is permitted by the design of the type MAC milling and centering machine brought out by the Davis and Thompson Co., Milwaukee, Wis. The machine operates on the continuous rotary principle.

Size of the work piece determines the number of stations in the rotary drum type fixture. During the cycle of the machine each station of the fixture picks up the centering heads. While they are being carried upward the centering spindles are fed into the work by means of stationary cams to produce a center of predetermined depth, retracted and released. Centering heads are returned to their low position by gravity. Shock produced by lowering heads is absorbed by air cylinders acting as dash pots.

Work pieces varying in length from 12 to 45 in. can be accommodated on a machine with a standard length bed. For longer work pieces special length beds can be provided.

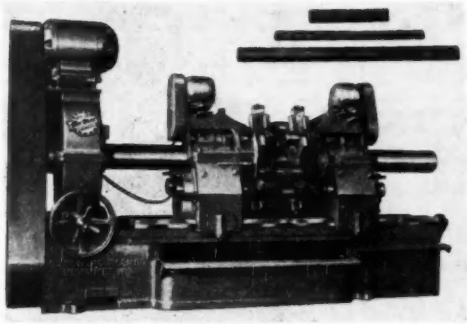
When six station fixtures are used, work pieces up to 4 in. in dia can be taken. Using a cutting speed of 10 in. per minute a production of 50 pieces per hr can be obtained.

Where eight station fixtures are provided, work pieces up to 2½ in. in dia can be run. A production of 65 pieces per hr is obtained with a 10 in. per minute cutting speed.

Fixtures are of the automatic centering type using a right and left hand screw with two Vee jaws.

NEW
Production and Plant
EQUIPMENT

For additional information please use coupon on page 54

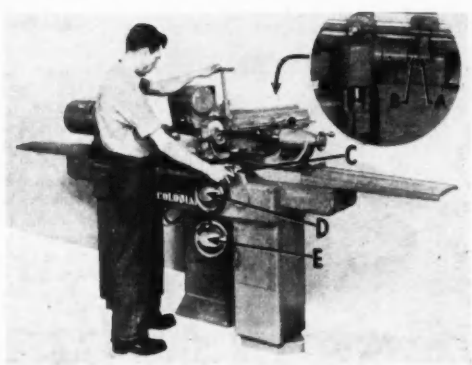


Davis and Thompson milling and centering machine, type MAC

B-103—Micro-Feed Broach Device

Designed for faster sharpening of both internal and surface broaches up to 36 in. in length, and 6 in. dia, a new universal broach sharpener, Model CS-36, has been added to the line of 7 sharpeners produced by Colonial Broach Co., Detroit, Mich. The sharpener features a "Step-stop" micro-feed control which automatically provides a definite stop for wheel travel in sharpening round, serration, spline, etc., broaches. The "Step-stop" operates through a heavy duty flexible shaft.

The "Step-stop" micro-feed is composed of a micro-feed hand-wheel (C) which controls the setting of a plunger (B) in the "Step-stop" control. Bracket (A) when it contacts the plunger, limits the travel of the wheel when using the hand lever. Setting of the bracket (A) for any broach is made with the wheel at full depth on the largest dia tooth on the broach, and with the plunger all the way out. The additional feed required from tooth to tooth as the broach dia decreases is provided by the micro-feed handwheel. This feed is approximately equal to the step per tooth. Where the step per tooth is small, the operator frequently can grind 3 or 4 teeth without using any hand feed by bringing the wheel up against the stop each time. Handwheel (D) raises and lowers the head on the column.



Colonial "Step-Stop" micro-feed device for cutting broach sharpening time

B-104—Industrial Circuit Breaker

A line of type DB 600-volt d-c or 250-volt a-c circuit breakers with accurate tripping characteristics for low-voltage power distribution in industrial plants, motor starting duty, and the like, has been placed on the market by Westinghouse Electric Corp., Pittsburgh, Pa. Control for long time delay with protection from tampering is provided by a unique time-delay element assembled in an hermetically sealed tube.



Westinghouse industrial circuit breaker, type DB-25

Two frame sizes are available. The DB-15 has an interrupting rating of 15,000 amp with load current ratings up to 225 amp at 600 volts a-c or 250 volts d-c. The DB-25 is rated for load currents up to 600 amp with an interrupting capacity of 25,000 amp.

B-105—Hydraulic Automatic Lathe

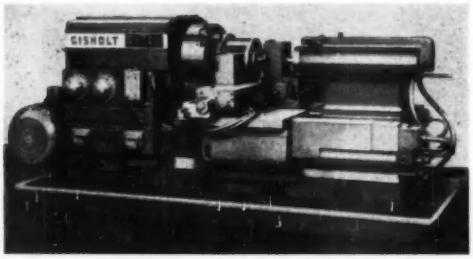
Official announcement is made by the Gisholt Machine Co. of Madison, Wis., concerning their No. 24 hydraulic automatic lathe, a production machine for heavy duty work which swings 35½ in. over the bedways. The machine embodies many of the basic principles of the company's No. 12, and is designed for processing such parts as tractor support rollers, Diesel cylinder liners and pistons, ball and roller bearing races, aviation and gas turbine parts, pipe flanges and large valve bodies, etc.

Standard equipment consists of front and rear independent carriages, each with its own auxiliary slide. Each slide has its own feed pump and controls and can be mounted to traverse and feed at any angle to the spindle centerline. Spindle speeds are selected by pickoff gears and the starting and stopping of the spindle is part of the automatic cycle.

Setup is simplified by hydraulic controls which permit the operator to make the slides run separately, stop at any point, back up or continue the cycle.

NEW
Production and Plant
EQUIPMENT

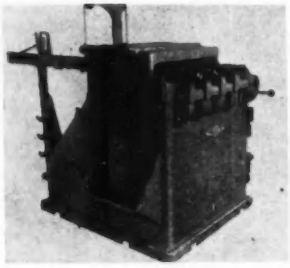
For additional information please use coupon on page 54



Gisholt hydraulic automatic lathe No. 24 designed for heavy duty work

B-106—Form and Cut-Off Machine

The Producto Machine Co., Bridgeport, Conn., is bringing out a new type, 4-spindle machine called Bar-matic, for high speed production of external forming, grooving, beveling, chamfering and cutting-off of bar stock.



Producto Bar-matic form and cut-off machine

The bar feed arrangement provides the use of low air pressure for rapidly feeding four 12 ft bars simultaneously to four adjustable positive stops. Four sets of forming and cut-off tools are mounted on a horizontal slide which is cam-operated longitudinally. This assures preservation of initial accuracy regardless of temperature conditions.

Spindle speeds are infinitely variable, ranging from 900 to 2000 rpm. Cycle changes are instantly obtained by hand wheel control, without stopping the machine. Complete parts, formed and cut off, may be produced on the Bar-matic at a rate of 1400 to 2400 pieces per hr. Capacity in dia is ⅝ in. maximum with cut-off length to 6⅝ in.

B-107—Cylindrical Muffle Furnace

Now coming off the production line of the Hevi Duty Electric Co., Milwaukee, Wis., is a new design in muffle furnaces primarily intended for general laboratory requirements such as drying of precipitates, ash determinations, fusions, ignitions, heating metals and alloys, enameling and ceramic firing, heat treating and experimenting.

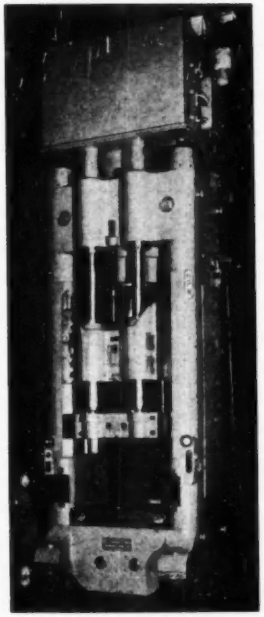
Departing from the usual rectangular shape, the new Hevi Duty muffle furnace is housed in a cylindrical shell mounted on a pyramidal type base with practically line contact between shell and base. This allows free circulation of air and eliminates trapped heat in the base.



Hevi Duty Electric Co.'s cylindrical muffle furnace

Improvements are these: Instruments and controls remain at approximately room temperature. Improved insulation design cuts radiation loss. There are 36 steps of control through a Hevi Duty tap-changing transformer.

B-108—Double Action Hydraulic Press



Designed and built by the Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, this giant 2000-ton capacity double action hydraulic press, destined for France, weighs 373,000 lb, towers 29 ft above floor level, requires a pit 10 ft deep in addition. It draws sheet metal parts to a depth of 24 in.; handles dies up to 72 in. sq. It is equipped with a 600-ton hydraulic blankholder and a 400-ton hydraulic die cushion. A double acting compound ram actuates the main slide. (Ed. Note:—We republish above picture of this massive press, which appeared, May 1st issue, printed inverted.

C-118—Perspective Drawing Device

News of a draftsman's instrument which makes it comparatively simple to create perspective drawings, issues from the Charles Bruning Co., Chicago, Ill. Called the Perspect-O-Metric, it automatically guides the draftsman's pencil toward the established vanishing points from any position upon the drawing board. Special scales instantly reduce distant portions of the subject to their correct proportions. The Perspect-O-Metric attaches to any standard drafting machine. It also is available for attachment to parallel ruling straight edges.

The instrument has three scale arms. The central arm is fixed in a position at right angles to the established base line. The left and right scale arms pivot at one end and swing in the plane of the drawing board.

The Perspect-O-Metric provides for two vanishing points, which can be located at any position along the edges of the drawing board. A small pulley is clamped over each of the chosen vanishing points. The swinging right and left scale arms are held in strict alignment with these vanishing points by a piano wire spring attached to the end of the scales, and then runs around the two pulleys (vanishing points).

Any movement of the Perspect-O-Metric creates a corresponding angular motion of the swinging scale arms. No matter where the Perspect-O-Metric is placed on the drawing board, the scale arms remain oriented to the chosen vanishing points. This feature saves the draftsman, architect or designer a vast amount of time and labor, for his scale arms are always automatically aligned.

To prevent the scales from shifting under the pressure of his pencil, a left and a right brake lever are provided. A pressure of the thumb locks the scale arm in position temporarily while the line is being drawn. The scale arm may be permanently immobilized by tightening a knurled nut upon the depressed brake lever. The Perspect-O-Metric may then be used for isometric drawings.

NEW ★ PRODUCTS

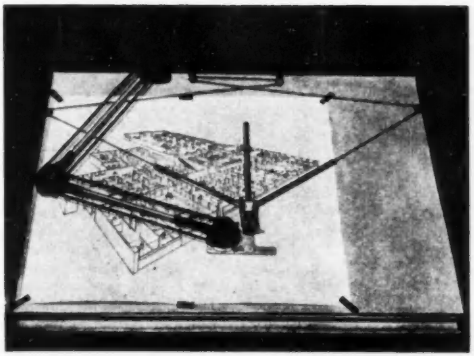
For additional information please use coupon on page 54

An ingenious sytem of graduation is used on the swinging scales. The distance between successive marks constantly diminishes as the draftsman moves toward the vanishing point. This keeps dimensions always in proportion, despite apparent reduction in size with distance. One edge of the scales is divided fractionally, the other edge decimally. Either edge may be used uppermost.

C-119—Soldering Tool

A high-speed precision soldering tool called Pres-To-Heat, has been placed on the market by the Appliance Div. of the Housing Foundation, Inc., Deep River, Conn., and is said to permit completion of some soldering jobs in less than 2 seconds, starting with an absolutely cold tool. This plastic tool, weighing 4½ oz, resembles long-nosed pliers and has an actuating lever on the handle. Slight pressure on the lever enables the operator to hold the work securely. Additional hand pressure causes the current to flow through the work, generating instantaneous heat at point of contact. A slight touch of solder then completes the joint.

Pres-To-Heat is claimed ideal where women are employed because of its light weight. It may be set down on metal surfaces without danger of short circuiting.



Bruning Perspect-O-Metric simplifies making perspective drawings

C-120—Rust-Resisting Steel Tubing

Announced by Jones & Laughlin Steel Corp., Pittsburgh, Pa., is development of a "Perma-tube" Electricweld steel tubing, coated with a unique plastic type rust-resisting finish. The new product is designed for inexpensive outdoor structures and other applications where light wall steel tubular members are exposed to corrosive atmosphere. "Perma-tube" can be fabricated by bending, expanding, flanging, upsetting, fluting, and flattening, without damage to the finish.



Jones & Laughlin "Perma-tube" Electricweld steel tubing

"Perma-tube" did not corrode until after more than 2000 hrs exposure in accelerated salt spray tests, it is reported, and in some cases lasted 3000 hrs before any corrosion appeared. In contrast, the ordinary commercial electro-galvanized tubing obtained from commercial stocks started to corrode in 24 hrs, and showed actual rust spots on the steel tubing after 350 hrs.

Subjected to the standard ASTM weatherometer test, which reproduces weather conditions such as exposure to sun rays, heat, humidity, and rain, "Perma-tube" is stated to have showed no corrosive effect after a test period equivalent to more than five years actual exposure to elements. Reversing the weather conditions to assimilate a cold climate found the coating on "Perma-tube" equally stable and unaffected by low temperatures. Initial humidity tests of "Perma-tube" are still in progress after more than 1000 hrs exposure to a 100 per cent relative humidity at a temperature of 130 F. "Perma-tube" also resists action of caustic chemicals and acids.

The tube is coated with a special finish consisting of Vinsynite pretreatment and a vinyl resin base, developed by Thompson & Co., Oakmont, Pa., and used exclusively on J&L Electricweld

steel tubing. The Vinsynite pre-treatment adheres tightly to the steel surface, phosphatizes the metal, and deposits a very thin film of about 3/10,000 of an in. of protective coating over the phosphatized surface in one operation. It is applied to the steel tubing by dipping.

An appropriately pigmented vinyl resin base, which has a dried film thickness of about 15/10,000 of an in. is applied over the Vinsynite pre-treatment. This provides an impervious film with tight adhesion to the Vinsynite.

"Perma-tube" is available in all sizes and shapes of Electricweld steel tubing now produced by J&L, up to 10 ft in length.

NEW ★ PRODUCTS

For additional information please use coupon on page 54

power motors, has been added to the line of Morflex couplings produced by Morse Chain Co., Detroit, Mich., a subsidiary of Borg-Warner Corp. Its Neoprene center member gives the new coupling a service life as much as ten times longer than ordinary couplings in its particular power range, according to Morse Chain engineers.

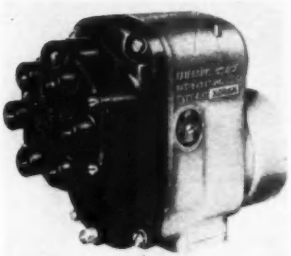
Flexing caused by misalignment is absorbed by the entire center member rather than by poor fit of pins, the designers claim. The tight fit of the coupling pins, when pressed into the rubber center member, is said to eliminate noise and vibration, resulting in quieter, smoother operation, and shock loads are cushioned.

C-121—Magnetos and Impulse Couplings

Fairbanks, Morse & Co., Freeport, Ill., present an improved line of magnetos for road machinery known as the "FM-X" line which includes 1, 2, 4 and 6-cyl magnetos suitable for all types gasoline engines. The new line replaces the "FM-J" line. Features are longer life breaker mechanism, larger bearings, improved magnetic rotor and improved timing facilities on the four cyl units. Included in the line is a 4-pole magneto, FM-XV4B7 (which is used by Wisconsin Motor Corp. on their V-type engines).

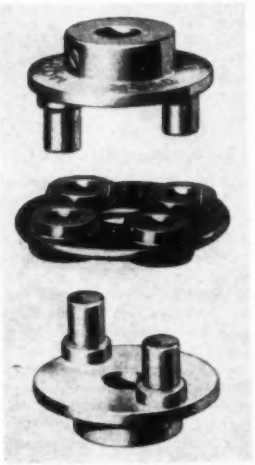
Along with this line of magnetos, a new universal impulse coupling known as the type UE has been developed. By use of this all-purpose coupling and one extra coupling hub, it is said to be a simple matter to make literally hundreds of magneto specifications. As an illustration—by using the UE impulse coupling, NY2563-C, built with the U2563 hub, a coupling can be made for adjusting to lag angles of 10, 20, 30, 40 or 50 deg.

The coupling also provides for adjustment to various lag angles to meet changing operating conditions. Each hub has two keyways: for clockwise rotation the keyway marked "R" is used, and for counter-clockwise rotation the keyway marked "L" must be used.



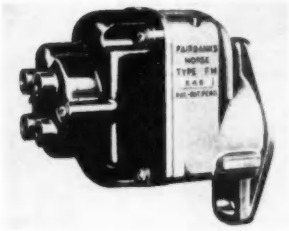
Fairbanks-Morse magneto, type XDRGA, for heavy duty engines. Available in base and flange mountings, in 4 and 6-cyl. models

C-122—All-Rubber Center Coupling



Morse "Mighty Midget" all-rubber center coupling

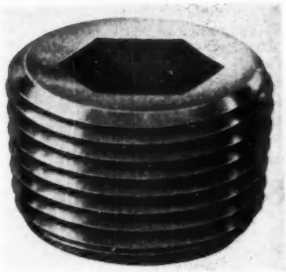
The "Mighty Midget," an all-rubber-center coupling designed for improved power transmission in fractional horse-



Fairbanks-Morse magneto, type FM-X4B, for medium sized engines. Available in either base or flange mounting, in 1, 2 and 4-cyl types.

C-123—Dry-Sealing Pipe Plug

The Allen Mfg. Co., Hartford, Conn., has designed two new hex socket pipe plugs for eliminating important causes of sealing failures. They are entirely pressure formed and threaded. Heads are cold drawn, retaining the full strength of the metal fibers instead of being weakened by drilling and broaching. Pressure forming also makes a perfect hexagon socket with smooth, perpendicular walls and with no chips at the bottom. Tests are said to have proved that the strongest key will shear before the socket strips.



Allen Dryseal pipe plug

The pre-established accuracy of "Pressur-forming" dies insures metal to metal contact all the way by producing burnished threads, and prevents distortion and nicked, imperfect threads which would gouge softer metals and impair the seal.

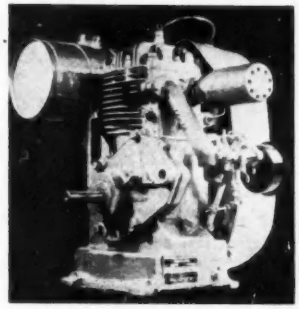
The new Allen Dryseal pipe plug is designed for use with dryseal taps and was developed for use where a perfect seal is absolutely essential and where any sort of sealing compound would be unsafe or inadvisable, particularly where extreme pressures are involved. Such applications include marine, automotive and aircraft fuel and oil line fittings; drain and filler plugs; ordnance gas shells and chemical bombs. Ac-

curate fit is assured by 360 deg roundness and by a perfect taper at both pitch and crest dia.

The new standard pipe plug is threaded in accordance with Army-Navy Aeronautical Specification AN-P-363, and is available in a size range of 1/16 in. to 1¼ in.

C-124—Air-Cooled Gasoline Engine

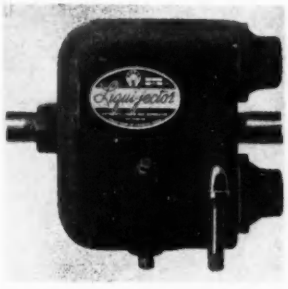
Commercial models of the "Husky" air-cooled engines being used in the 1949 series Cushman motor scooters are now available as basic power units for farm and industrial installations



Cushman air-cooled gasoline engine, the "Husky"

requiring four-cycle single cylinder engine, clutch and transmission equipment.

The three models consist of the M6 having 1.5 to 3.0 hp with 12.3 cu in. displacement; the M7 having 2.3 to 4.6 hp with 14.9 cu in. displacement; and the M8 having 2.8 to 5.2 hp with 17.8 cu in. displacement, providing either clockwise or counter-clockwise rotation. The models are provided with adjustable-taper roller main bearings, automotive precision type connecting rod bearings, adjustable flyweight type governor fully enclosed, and high voltage magneto. All models have the same external dimensions. Component parts are 90 per cent interchangeable. Rope or kick starter can be furnished.



Selas Liqui-Jector for compressed air or gas lines

NEW ★ PRODUCTS

For additional information please use coupon on page 54

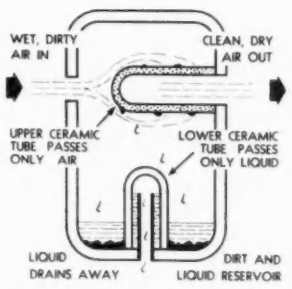
C-125—Air or Gas Line Conditioner

Water and water-oil emulsions are removed automatically and continuously from compressed air or gas lines by the newly designed Liqui-jector, a product of Selas Corp. of America, Phila., Pa. The equipment is utilized in precision pneumatic operations that require positive conditioning of air or gas. Typical applications are in liquid separation, agitation, drying, spraying, and in the operation of instruments and pneumatic mechanisms.

Phase separation and liquid ejection are accomplished by two ceramic tubes; one water-repellent, the other water-permeable but air-impervious. Compressed air or other gas passes through the first tube where it is stripped of its aqueous contamination and dirt. Moisture drops to the bottom and drains through the second tube without loss of air.

The water ejection rates for the three sizes of the equipment vary from 0.5 to 2.5 gal per 24 hrs. The Liqui-jector acts also as a filter, removing atmospheric dirt and finely divided solid particles, even finer than 100 microns in dia.

The housing of the Liqui-jector is cast bronze. There are no moving parts, traps, cocks, or shutoffs. Maintenance is limited to periodic inspection and removal of accumulated dirt.



The operation of the two ceramic tubes of the Selas Liqui-Jector

C-126—Paint and Air Heater



Bede paint and air heater, model U

New explosion-proof paint and air heater, Model U, for production spraying of paints, lacquers and synthetics, is the latest item at Bede Products, Inc., Cleveland, Ohio.

With this new model no water or heat transfer liquid is necessary, since aluminum is used as the heat transfer agent between the two 1000-watt cartridge type heaters, paint heating coils, and air heating coils. A layer of glass wool insulation surrounding the heating unit prevents heat loss, and a sturdy sheet steel outer shell provides protection against damage.

With the Bede paint and air heater, heavier, better-quality paint films are attained by heating the paint—lowering its viscosity and enabling the solid content to be increased by reducing the amount of thinner used, one coat often taking the place of two.

The unit comes up to operating temperature within 15 min. Temperature is accurately maintained at pre-set values by a thermostat and thermoswitch. A thermometer records the paint temperature as it leaves the heater. No attention, other than plugging in the unit, is required.

The Model U is available for 110 or 220 volt A. C. operation. Capacity is approximately eight gal per hr. A circulating system, for use with longer paint hoses or for intermittent spraying, is available separately.

C-127—All-Purpose Hose

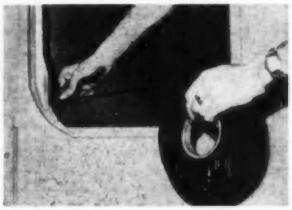
Goodyear Tire & Rubber Co.'s mechanical goods division, Akron, Ohio, announces a new all-purpose hose labeled "Ortac," and capable of carrying air, water, oil, gasoline and acids of low concentration and temperature. The hose is made with vertically braided rayon carcass and oil-resisting synthetic tube, friction and cover, in sizes from 3/16-in. to 1½-in. ID.

C-128—Impregnated Sealing Felt

Successfully used by the Navy and Maritime industry for ventilation and deck drainage sealing for over eight years, a zinc chromate impregnated gasketing felt called Chrome Lock—manufactured by Products Research Co., Glendale, Calif.—is finding application in the automotive industry as both an original manufacture and a replacement seal.

Chrome Lock is used on bus and trailer skin laps and around window sashes and fenderwells; in automobile heating and air conditioning systems; and in chassis parts requiring vibration cushioning and air, dust or water protection.

It gaskets or seals all types of faying surfaces such as flanges and lapped or butted joints. Under bolted, screwed



Strip use of Products Research Co.'s Chrome Lock felt

or nailed pressure the resins traverse within the felt and are also extruded in quantities to form a positive dam, whether to exclude or to retain, air, water, dust, etc. Its pressure-sensitive adhesive back permits one man to lay hundreds of feet of gasketed surfaces without assistance, even on vertical or inverted installations, the company states.

Chrome Lock resists permanent distortion, having 75 per cent to 100 per cent recovery after pressure release, thereby maintaining a positive seal for the life of the installation. Under locked in pressure it does not tend to oxidize and harden, nor to develop a permanent set which ultimately results in leaks, declares the company.

Under bolted pressure Chrome Lock is said to fill in all face irregularities in a joint, as well as in and around all bolt or rivet holes. Under locked in pressure it extrudes resins onto the surface and into all rust pocks in the joint facings. These non-oxidizing resins hold the metal in a passive state, preventing rust in new installations and arresting corrosion in old. Chrome Lock is said to completely inhibit electrolytic action between dissimiliar metals.

Its compressibility and laminating qualities permit low belt torque pressures and in turn use of lighter flange materials. On rectangular flanges of 24 gage 0.025 metal, stock Chrome Lock tapes can be used by merely lapping at the corners. Under rivet or bolt

NEW ★ PRODUCTS

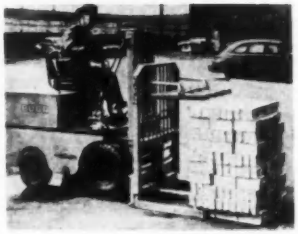
For additional information please use coupon on page 54

pressure Chrome Lack is reported to laminate completely to form a perfect seal. Under locked in pressure it maintains complete anti-wicking protection since it is non-soluble in any water or saline solutions.

For non-flammable installations nontoxic Chrome Lock Type N is specified. In special compoundings slight variances in impregnations produce properties that provide a wide range of heat, cold and pressure resistance.

Four thicknesses available are 1/32, 1/16, ⅛, and 1/16 in., in any width from 3/16 in. to 72 in. Lengths are 100 ft in 1/32 and 1/16 in. thicknesses; 50 ft in ⅛ in. thickness; and 25 ft in ¼ in. thickness. The product is also available in stamped gasket forms.

C-129—Hydraulic Gripping Forks



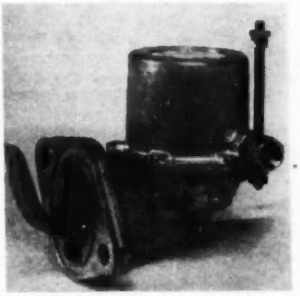
Buda fork lift truck, model FP20, equipped with Liftall gripping forks

Pallet-less hydraulically operated load handling forks for lifting bricks, barrels, boxes, and bags are now available for all models of fork lift trucks manufactured by the Buda Co., Harvey, Ill. One of the features of these "all-purpose" gripping forks is the positive gripping of load until the load weight is relieved.

The gripping forks come in three main styles: two forks for holding the sides of a barrel or a unit load of package goods, four rubber padded forks for gripping the bottom tiers of bricks (illustrated), and four semi-curved forks for lifting two rows of bags.

C-130—Diaphragm Type Fuel Pump

Being produced in limited quantities for use in taxicabs made by Chrysler Corp., a new diaphragm type fuel pump for automobiles, trucks and general industry is announced by F. L. Jacobs Co., Detroit, Mich. The fuel pump uses a single soft type valve of synthetic rubber for both the inlet and



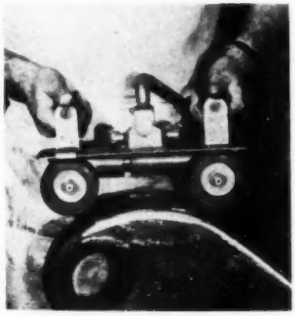
Jacobs diaphragm type fuel pump

outlet sides, instead of the two or more hard type valves used in many present pumps. Pliability of the synthetic rubber valve is claimed to make it easier to maintain a vacuum or a pressure than if a hard type valve is used.

The pump has two large equalizing domes, one on the inlet, the other on the outlet side which tend to maintain a more even constant flow of fuel through the pump, the company declares.

C-131—Air-Driven Belt Sander

Adaptable for metal work on all types of surfaces, whether concave or convex, a new air-driven belt sander is being introduced by Buckeye Tools Corp., Dayton, Ohio. An addition to the Buckeye Stream-Power line of portable air tools, the new sander is applicable to all types of metal finishes, both sheet metal and solid castings and



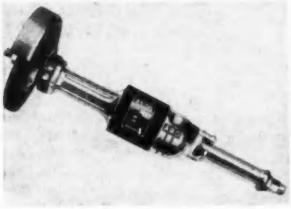
Buckeye air-driven belt sander

to all types of materials in iron, steel, brass, bronze, solder, aluminum and magnesium. It is also suitable for finishing and sanding wood products.

C-132—Air-Powered Grinder

An 8-in. lightweight air-powered portable grinder for heavy duty grinding and polishing has been brought out by the Aro Equipment Corp., Bryan, Ohio. It is recommended for production grinding, polishing and metal cleaning operations including work on castings, patterns, parts, machinery, structural metal, and other heavy duty jobs.

The grinder is designed with high strength magnesium castings for lightness, and a steel housing for protection. The tool weighs only 14 lb, with form-styled handle and spindle for perfect grip. Speed is governor-controlled whether idling or under heavy load, preventing racing of the motor under light loads.



Aro lightweight 8-in. grinder

The grinder is available in spade and straight handle models, 6 in. and 8 in. sizes, with selected range of speeds including 4200, 4500 and 6000 rpm. All models have ⅝ in. by 11 spindle thread. The tools are furnished with a choice of grinding wheel or wire brush.

C-133—Electronic Overload Control

A new electronic overload control, the PN 123 Protectron, is available from the Brinnell Co., Granby, Conn., for protecting valuable dies. It is for normal operating loads of from 1 to 100 amp. Loads above 100 amp can be handled by addition of a small current transformer. A "normal load finder" eliminates the need of taking ammeter readings for setting the unit when tool changes vary the normal load. Unit supply voltages of either 110 volts or 220 volts can be handled by the new model, which also operates on drive circuits of 110, 220, 440, and 550 volts, 60 cycle. The model replaces three former models designed for intermediate load ranges.

All Protectron models combat jamming in automatic feed presses and eyelet machines by sensing slightly oversized stock "pile-ups," dull punches, hard stock and other causes, before damage occurs.

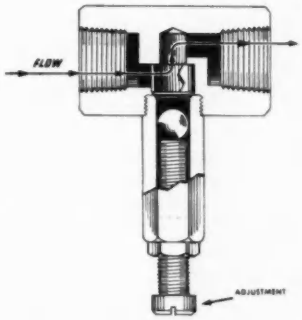
The Protectron is not a current overload device since it takes into consideration both voltage and current. Set to trip at any predetermined mechanical load increase above normal, it is instantaneously sensitive to mechanical overload through its attended volt-amp increase in the input to the drive circuit.

NEW ★ PRODUCTS

For additional information please use coupon on page 54

C-134—Velocity Limiting Valve

A velocity limiting valve for use in air systems where top limits of flow velocity and volume are desired, has been introduced by Pneu-Trol Devices, Inc., Chicago, Ill.



Pneu-Trol velocity, limiting valve

Easily connected into any air or gas line, the velocity limiting valve, when set to any of its infinite number of pressure calibrations, instantaneously shuts off line flow whenever the velocity or volume exceeds the desired setting. A stainless ball is pulled up against its seat and held in the "closed" position by line pressure whenever the flow exceeds the setting. When the pressure is exhausted, the ball drops off its seat and re-sets itself. Screwing the adjusting screw in or out of the valve lowers or raises the pressure setting at which the valve closes.

A typical application is its use in air ejection of pieces from multiple cavity molds. The air line to each cavity incorporates a velocity limiting valve which instantly shuts off the flow of air to any open cavity—a necessity when operating with two or more cavities.

The valve is available in ¼ in. and ⅜ in. pipe size and is made of brass bar stock with stainless steel parts and internal fittings.

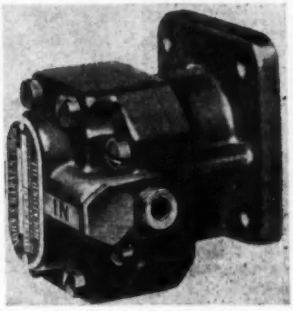
C-135—Free Machining Bessemer Steel

A new bessemer steel bar stock, called USS "MX" free machining steel, is being produced by Carnegie-Illinois Steel Corp., Pittsburgh, Pa. When used in automatic screw-machine operations, "MX" steel is claimed to provide substantially longer tool life and greatly improved surface finish of parts, with up to 20 per cent increase in machinability over standard bessemer steel bar stock of comparable grade.

"MX" free machining steel, under development for over five years, has been designed specifically to augment the machining characteristics of Grade B-1113 steel in many applications where that grade was recommended formerly. The new steel at the same time has been shown to perform well in subsequent operations such as forming or crimping the machined parts. It has been used very successfully, the company states, on extensive production test runs in the manufacture of automatic screw-machine parts.

"MX" steel is available in hot rolled bars from Carnegie-Illinois Steel Corp., and in cold finished forms from cold finishing plants.

C-136—Line of Pressure Pumps



A line of high pressure pumps designed particularly for use on farm tractors, power units, trucks, and material handling equipment, has been added to the line of Constant-Flo rotary gear pumps, manufactured by the John S. Barnes Corp., Rockford, Ill. The new pumps maintain continuous pressure up to 1000 psi, and intermittent pressure up to 1500 psi. All have the same mounting dimensions as the standard low pressure models. Design includes anti-friction bearings.

PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

A-160 Automatic Lathe

Gisholt Machine Co.—The No. 24 Hydraulic Automatic Lathe is pictured and described in a new bulletin. Information included covers construction, driving arrangement, tooling arrangement, change-over, equipment and specifications.

A-161 Welding Rods

All-State Welding Alloys Co., Inc.—A new, 32-page, pocket-size handbook and catalog lists and illustrates the company's rods and fluxes, including several new items. The booklet contains tables of characteristics, full application information and helpful hints of general interest to workers in the metal-joining industries. Among the new products listed is a cutting electrode, a tinning rod and a sampler kit containing silver solder and ten other types of gas welding rods with appropriate fluxes.

A-162 Protective Coatings

Dennis Chemical Co.—A four-page folder on Perma-Skin, a Vinyl corrosion-resistant protective coating, lists many uses for this coating, gives characteristics and applications of the Perma-Skin system.

A-163 Lucite HM-140

E. I. du Pont de Nemours & Co. Inc.—An attractive folder on the new Lucite HM-140 is available. In addition to giving molding advantages, color is discussed and a table of properties is included.

A-164 E-Con-O-Mills

The Gairing Tool Co.—A new 8-page catalog describes and illustrates the E-Con-O-Mill, a standard face mill with replaceable carbide tipped blades, available in a Cone-Type and a Heavy-Duty model. Specifications on both the cone-type and the heavy-duty models are included.

A-165 Safety Tools

Ampco Metal, Inc.—A completely revised Safety Tool Bulletin gives information about the full line of Safety Hand Tools.

A-166 Tapping Machines

Etteo Tool Co., Inc.—A new bulletin describes the No. 72 Etteo-Emrick Foot Operated Tapping Machine. It contains a description of the machine and its operation. Results obtained on actual production jobs are included, together with a table of models and capacities available, complete with price list.

A-167 Reproduction Materials

Eastman Kodak Co.—A 72-page handbook on photographic techniques for engineering reproduction is available from the Industrial Photographic Div., 343 State Street, Rochester 4, New York. The handbook is priced at 50 cents a copy. The handbook is titled How to Use Kodagraph Reproduction Materials and diagrammatically illustrates methods of copying various types of drawings and of restoring or reviving old, or faded drawings. Special sections of the book describe recommended procedures for special copying problems. The handbook is designed to serve as a reference work for reproduction departments and as a guidebook for engineers who want to eliminate handwork in reproducing drawings and retain optimum print quality.

A-168 Expansion Joints

Chicago Metal Hose Corp.—Bulletin EJ-49 is a new, 2-color illustrated bulletin which gives engineering and product information to operating and engineering personnel. Information given covers both Free-Flexing and Controlled-Flexing corrugated type expan-

(Turn to page 76, please)

TIME SAVER COUPON for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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Euclid Dump Trucks **HAUL MORE AT LOWER COSTS** with body sections of J&L OTISCOLOY high-tensile steel

J&L STEEL



Above, welding a twenty-two-ton-capacity Euclid truck body made of J&L *Otiscoloy High-Tensile Steel parts.*

J&L OTISCOLOY in trucks, built for the toughest hauling jobs, pays off for both the manufacturer and truck operator.

The Euclid Road Machinery Company, of Cleveland, Ohio, has *six* good reasons for building vital parts of bodies for its heavy duty hauling equipment out of J&L Otiscoloy *High-Tensile* Steel. These bodies are built to meet today's toughest hauling requirements—*at low operating costs.* Every useless pound of dead-weight is designed *out* of the bodies in order to handle largest possible loads at high speed. Stamina is all-important, because these trucks operate in off-the-road service—in mines, quarries and heavy construction work.



The six reasons why Euclid uses J&L Otiscoloy are:

1. Otiscoloy is twice as strong as mild steel.
2. Otiscoloy has 50% greater fatigue resistance than mild steel.
3. Otiscoloy has 4 to 6 times greater resistance to atmospheric corrosion than mild steel.
4. Otiscoloy has substantially greater abrasion resistance than mild steel.
5. Otiscoloy is easily welded by any of the standard methods.
6. Otiscoloy can be readily cold formed.

If you are interested in eliminating *useless* dead-weight, obtaining better resistance to corrosion and abrasion, get *all* the facts on J&L Otiscoloy *High-Tensile* Steel. Let us send you the booklet mentioned in the coupon.

Jones & Laughlin Steel Corporation
430 Jones & Laughlin Building
Pittsburgh 19, Pa.

Please send at once a copy of your booklet: "Otiscoloy High-Tensile Steel."

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L *manufactures a full line of carbon steel products, as well as certain products in* Otiscoloy *and* Jalloy *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

PERSONALS

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

Kaiser-Frazer Corp. — The appointment of **Clay P. Bedford** as Executive Vice-President has been announced.

Chevrolet Motor Div., General Motors Corp.—**George A. Greig** has been appointed Manager of the Market Analysis and Research Dept.

Ford Motor Co.—**Roscoe M. Smith** has been appointed Asst. Director of the office of quality control. Mr. Smith will become director of the office of quality control on the retirement of **Richard Kroll**, present director, in July.

Ford Motor Co.—The appointment of **C. E. Dalton** as General Manager of the Overseas Distributors Branch, has been announced.

Ford International, Inc.—**Thomas A. Moore** has been appointed Parts and Accessories Sales Manager and **Francis H. Blake** Assistant Parts and Accessories Sales Manager.

The White Motor Co.—**William M. Fitzgerald** has been named Hartford Branch Manager for the company.

Eaton Manufacturing Co.—**Frederick C. Schwendler** has been appointed Chief Engineer of the company's Stamping Div.

The Cleveland Punch and Shear Works Co.—**A. J. Fitzgerald** has been appointed to the position of General Manager. **A. W. Schultz** has been appointed to fill the position of Sales Manager, vacated by Mr. Fitzgerald.

Ohio Stainless & Commercial Steel Co.—**Clayton E. Scholes** has been made General Manager of the OSCO Steel Div. **N. A. Wade** has been appointed Asst. Manager and **Owen W. Brock**, Warehouse Manager.

The Lincoln Electric Co.—The election of three additional members to the Board of Directors has been announced as follows: **G. F. Clipsham**, Asst. to the President; **William Irrgang**, Director of Plant Engineering; **L. K. Stringham**, Director of Welding Development.

General Petroleum Corp.—**Charles H. Wartman** has been named manager of the marketing department.

Transportation Sash Co., Inc.—**A. C. Kuss, Jr.** was elected President, succeeding **Charles E. Ferreira.** Mr. Ferreira was elected Chairman of the Board of Directors.

L. G. S. Spring Clutch Corp., Curtiss-Wright Corp.—**Albert F. Korf** has been appointed Sales Manager.

Necrology

Joseph Oriel Eaton, 75, chairman of the board, Eaton Manufacturing Co. died on May 15 in Cleveland.

S. B. Waring, 60, secretary-treasurer, the Morse Chain Co., subsidiary of Borg-Warner Corp., died May 11, in Ithaca, N. Y.

Dr. Arthur Berkeley Yates, 47, formerly chief geologist, International Nickel Co., died in Montreal, Canada on May 10.

Clarence W. Avery, 67, chairman of the board, Murray Corp., died recently at Plainwell, Mich.

Ellinwood Industries — The appointment of **W. R. Moreland**, as Vice-President, Administrative, has been announced.

Maumee Malleable Castings Co.—Four promotions in the management have been announced as follows. **E. H. Doering** has been named Executive Vice-President; assisting Mr. Doering will be **N. P. Mahoney**, Plant Manager. **R. E. Bossert** has been made Sales Manager and **H. M. Breese** is Secretary, in addition to being Treasurer and Purchasing Agent.

Federal Motor Truck Co.—Appointment of two new Assistant General Sales Managers has been made; they are **H. J. Hamernik** and **A. R. Winberg.**

Bound-Brook Oil-Less Bearing Co.—The election of **W. R. Toeplitz** and **Samuel S. Connor** to the Board of Directors is announced.

The American Swiss Co. **R. L. Morris** has joined the management of the company as Vice-President.

General Electric Co. — **Joseph P. Coughlin** has been appointed assistant manager of the Specialty Transformer Sales Div.

The Four Wheel Drive Auto Co.—**M. O. Stockland, Jr.**, now Advertising and Sales Promotion manager will become Director of Sales on July 1, 1949. **Robert L. Koehler**, present Director of Sales, has resigned.

American Brake Shoe Co.—**Donald C. Sheldon** has been elected Asst. Treasurer and **Kenneth A. Anderson** has been elected Asst. Secretary.

Revere Copper and Brass Incorporated—**Ervin A. Arnesen**, has been elected as a Vice-President of the company. Mr. Arnesen is General Manager of the Chicago Manufacturing Company Division of Revere.

The Johnson Rubber Co.—**William R. Edwards** has been appointed Sales Manager.

Standard Steel Spring Co.—**Louis P. Monk**, Vice-President, is a newly elected member of the Board of Directors. **Edward L. Severing** is the newly elected Assistant to the President, Robert C. Enos.

The Budd Company, Automotive Div. —**Raymond F. Littley** has been named Sales Manager of the division.

The Electric Auto-Lite Co.—**R. E. Hilkert** has been made assistant to C. H. Munson.

Standard Electric Co., Inc.—The promotion of **W. C. McKinney** to the position of Sales Promotion Manager has been announced.

International Acetylene Assn. — **Arthur J. Fausek**, President of Modern Engineering Co., St. Louis, was elected President of the Association.

Fuel Spray Nozzles for Aircraft Gas Turbines

(Continued from page 38)

to meter at the nozzles.

The ability to handle dirty fuel has become a most important requirement of a fuel-feeding device. Means for atomizing other than the swirl nozzle show more promise of meeting this important requirement.

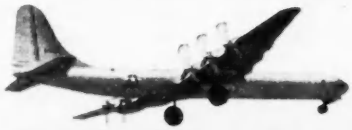
It is difficult to find any general agreement in the industry as to the method to be used in appraising the merits of fuel nozzles. The variety of types of fuel-feed equipment being tested and in use, however, is evidence that the industry is actively searching for better and more efficient methods of fuel spray.

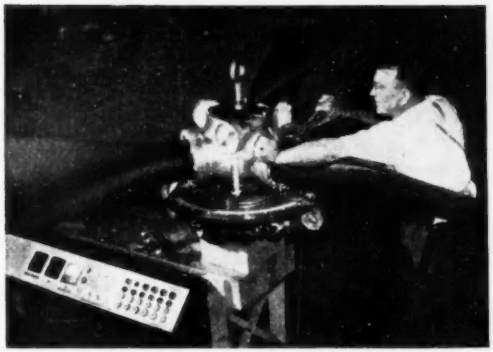
The experience of the past several years with nozzles of various types seems to us to warrant the hope that this search may in the near future result in important improvements in fuel atomizing equipment for aircraft gas-turbine engines.

Bibliography

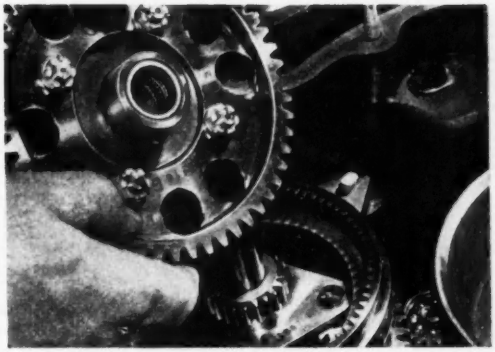
1. Development and Testing of a Gas-turbine Combustor, by A. E. Hershey, Trans. of ASME, November, 1947, pp. 859-867.
2. Oil Burning, by H. A. Romp, Martinus Nijhoff, the Hague.

Torrington Needle Bearings provide compact, rugged design for Curtiss-Wright B-36 propellers

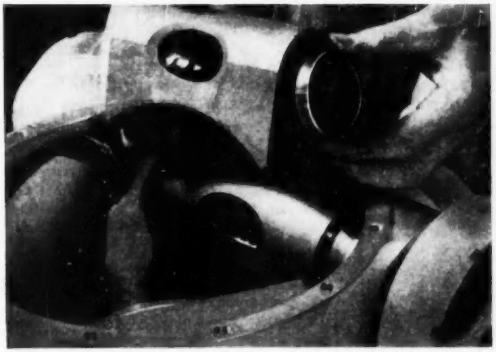




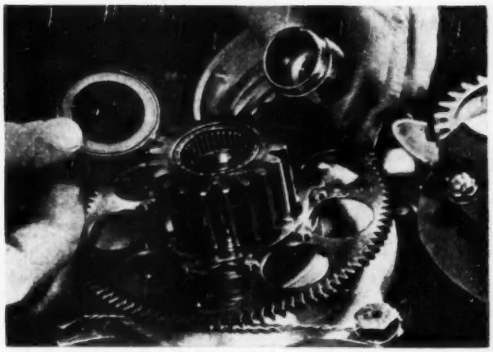
Space is at a premium in the pitch control mechanism of the Curtiss-Wright C636S propellers used on the B-36. Essential, too, are lightweight design and rugged construction. Torrington Needle Bearings are used in this mechanism because they provide exceptional compactness and load capacity.



Rotating continuously at 1600 rpm, the drive gear assembly operates efficiently on high-capacity Needle Bearings. During pitch change, each bearing carries radial loads of nearly 400 pounds. The full complement of rollers provides a high factor of reliability and assures long service life.

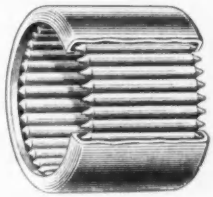


Three large worm gear shafts are mounted on Needle Bearings, and housings are kept relatively small. Stationary during fixed pitch operation, these gears need the high static non-brinell capacity of Needle Bearings—plus their smooth anti-friction operation at 1200 rpm during blade feathering.



Lubrication is no problem with Needle Bearings. Take this braking assembly as an example. The lips of the bearing ride close to the shaft and help conserve lubricant. The Needle Thrust Bearing, at the left, is specially designed for this application to provide compactness and high thrust capacity.

To secure the benefits of anti-friction operation at minimum cost in your designs, use Torrington Needle Bearings. Let our engineers help you with any related design or installation problems. Write us today. THE TORRINGTON COMPANY, Torrington, Conn., or South Bend 21, Ind. District offices in principal cities.



TORRINGTON *NEEDLE* **BEARINGS**

Needle • Spherical Roller • Tapered Roller Straight Roller • Ball • Needle Rollers

NEWS *of the* AUTOMOTIVE INDUSTRIES

(*Continued from Page 23*)

proof distributor with built-in 10,000-ohm resistor in the cap is used across the board on cars built by all divisions. The only exception to this is on the short wheelbase Plymouth models, the P-17 chassis, and on short wheelbase Dodge models—the D-29 chassis. Engines on the short wheelbase cars are fitted with the standard distributor, the same as previous models, hence do not have the 10,000-ohm resistor in the cap. On these two lines, therefore, suppression is effected by the resistor spark plugs alone.

Cleveland Graphite Bronze to Get Harris Products

The Cleveland Graphite Bronze Co. is reported to be acquiring ownership of Harris Products Co. through an exchange of stock. The plans call for continuing the Harris organization as a subsidiary with existing personnel to be maintained. The company produces vibration absorbing mountings and shackles used in the automobile industry, and has plants at Cleveland and Milan, Ohio.

Douglas Wants to Make Parts for Western Car Assembly

The Douglas Aircraft Co. is now negotiating with several major automobile manufacturers to fabricate automotive parts for West Coast assembly plants, Harry Woodhead, general manager of Douglas' Western Pressed Metals Div., told AUTOMOTIVE INDUSTRIES. Since the inception of the program, the Douglas unit has manufactured thousands of fenders, deflectors and shells for the automotive aftermarket.



Acme

PROP ON THE SIDE

The new British Fairey Gyrodyne helicopter features a propeller on the left side of the stub wing for forward propulsion. A new international speed record for rotor aircraft of 124.3 mph is said to have been set by a helicopter of this type. The Fairey Gyrodyne reportedly has a cruising speed of 115-120 mph.

Gyro Motors Develops New Engines for Cars

Gyro Motors Corp., Cleveland, O., has developed new lightweight four and six-cyl engines for passenger cars to be introduced to the market shortly. Featuring a new valving arrangement, an improved cooling system and cylinder jacket construction, the engine has cylinders of light aluminum alloy with steel liners.

All Major Car Makers At Philadelphia Show

Nearly $1 million worth of exhibits will be displayed at the first major U. S. postwar automobile show, the 1949 Philadelphia Automobile Show, which will be held in Philadelphia from June 11 to 18. Every major car manufacturer in the U. S. is participating in the show which will also display 65 fine antique automobiles, according to the Philadelphia Automobile Trade Association.

Specification Board Asks Truck Change Comments

The Federal Specifications Board has sent copies of proposed specifications for 6400-lb GVW, gasoline-powered, four-wheel rear drive trucks to manufacturers for comment. It has also sent truck manufacturers a proposed amendment to specifications for two rear wheel drive trucks of 15,000 GVW and over. The proposed amendment specifies that such trucks, powered with gasoline engines, shall be capable of being propelled at a road speed of at least 45 mph in direct drive at or below the maximum governed speed of the engine when operated on a dry, level, hard-surfaced roadway. The specifications board is asking the manufacturers for comments and criticisms on the proposed amendment.

Capt. Bolster New Asst. Chief of Navy Air Research

Captain Calvin M. Bolster, now serving as Deputy and Assistant Chief, Office of Naval Research, will relieve Rear Admiral Theodore C. Lonnquest, as Assistant Chief of the Bureau of Aeronautics for Research and Development. Rear Admiral Lonnquest will take the post of Deputy Chief of the Bureau of Aeronautics, and Captain Bolster will be relieved by Captain

(*Turn to Page 60, Please*)

1949 SHIPMENTS OF CIVIL AIRCRAFT AND AIRCRAFT ENGINES AND OTHER PRODUCTS OF THEIR PLANTS*

	February	Two Months
Civil Aircraft:		
Personal Planes:		
Number	226	377
Value	$ 1,189,788	$ 2,120,572
Transport Planes:		
Number	31	40
Value	$10,285,545	$12,915,644
Aircraft Parts—Value	$ 2,549,137	$ 4,899,494
All Other Products—Value	$ 2,007,180	$ 3,503,079
Total—Value of Civil Aircraft and Other Products	$16,031,650	$23,444,789
Civil Aircraft Engines:		
Number of Engines	479	743
Value of Engines	$ 1,479,852	$ 2,830,140
Value of Engine Parts	$ 1,901,277	$ 3,633,967
All Other Products of Aircraft Engine Plants—Value	$ 118,124	$ 269,243
Total—Value of All Products of Aircraft Engine Plants	$3,498,053	$ 6,733,350

* Bureau of the Census and Civil Aeronautics Administration. No data available for military planes or military aircraft engines.

THESE BOLTS ARE SOMETHING SPECIAL...



Down time is costly. Earth-moving equipment, tractors and other heavy machinery need bolts that can resist extremely severe stress, shear and impact without wear or breakage.

"National" makes special bolts for such rugged service from high carbon or alloy steel, specially heat-treated.

These bolts can really stand the gaff.

Exceptional experience and facilities in *cold heading* enable us to offer unusual service on all types of "specials" that can be made by the upset process. We are often able to effect substantial savings.

Please send us your inquiry.

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3421 S. Garfield Ave., Los Angeles 22, Cal.



National
HEADED AND THREADED
PRODUCTS

"National" Products Include

HODELL CHAINS · · · CHESTER HOISTS

General News

(*Continued from Page 58*)

John B. Pearson, Jr., who is now serving as Overhaul and Repair Officer, Naval Air Station, Norfolk, Va.

Delco-Remy Cuts Battery Prices 15 Per Cent

GM's Delco-Remy Div. has announced price reductions averaging 15 per cent on the complete line of Delco passenger car, truck, bus and tractor batteries.

British Car Group Head Voices Fear of Nationalized Steel

Fear of the effects of nationalized iron and steel on the British automobile industry has been expressed by F. I. Connolly, president of the Society of Motor Manufacturers and Traders. "Nationalized steel," he declares, "will mean dear steel. On the productive side of industry Government monopoly is even more dangerous than a private price ring. There are many ways to break a private price ring, but Government monopoly can be under no such threat, nor can it be restrained by the threat of imports, which the Government itself controls. It will not only be price that the Iron and Steel Corp. will dictate. Can anyone doubt that those who control the Corporation will decide what is to be made. In pre-war days many in the automobile industry criticized the steel industry. These criticisms were based on two grounds—too much centralization and too little competition. The new Steel Bill will mean more centralization and less competition."

Whitman & Barnes Moves to Plymouth, Mich.

Whitman & Barnes, Div. of United Drill and Tool Corp., has moved from Detroit, Mich., to Plymouth, Mich. Their new factory and office is built on a 26-acre site with over 250,000 sq ft of floor space.

Army and Delco-Remy Develop Battery for Arctic

In cooperation with GM's Delco-Remy Div., the Army Signal Corps engineering laboratories at Fort Monmouth, N. J., have developed a new battery that will reportedly start an engine at a temperature of —65F.

Labor Disputes Down for 1948

Issued while Congress still wrangles over repeal of the Taft-Hartley Act, a Labor Dept. report on labor disputes for 1948 shows a continued down-trend in strikes. The department includes all stoppages involving six or more workers for one day or more.

Repealists insist that instead of curbing strikes, the act actually foments work stoppages. Offsetting the charge is the department report showing fewer strikes, fewer workers involved, and fewer man-days lost than in either 1947 or 1946. For work stoppages, the department report shows 3419 in 1948 as compared with 3693 in 1947, and 4985 in 1946, the last full year of the Wagner Act. In the number of workers involved, the same report shows 1,960,000 in 1948, as compared with 2,170,000 in 1947 and 4.6 million in 1946. As to work time lost, the figure for 1948 was 34.1 million, in 1947 it was 34.6 million, and in 1946 it was 116 million. Percentages of work time lost were given as .37 last year, .41 in 1947, and 1.43 in 1946. Prewar averages were: stoppages, 2613; workers, 1.7 million; idleness, 16.9 million man-days; and worktime percentage lost, .27. Wage disputes ranked first as the cause of strikes last year, the department says. And among industries, the greatest unrest was in mining (largely coal), with 615 individual strikes. Construction was second with 380.

Ellinwood Back in Aircraft Parts Business

Ellinwood Industries, Los Angeles, has reentered the aircraft hydraulics, electronics component parts, and accessories business, with the reversion of the Martin basic patents to Ellinwood, according to H. Ray Ellinwood, president.

CALENDAR

Conventions and Meetings

Paris Fair, Paris, France....May 21-June 6

Canadian Int. Fair, Toronto, May 30-June 10

SAE Summer Mtg., French Lick..June 5-10

Phila. Auto Trade Assoc. Show, Phila. .....June 11-18

Nat'l Truck, Trailer & Equip. Show, Los Angeles .....June 15-18

ASME Conference Applied Mechanics, Ann Arbor .....June 13-15

American Inst. of Elec. Engineers, Swampscott, Mass. .....June 20-24

Amer. Soc. for Testing Materials Annual Mtg., Atlantic City..June 27-July 1

Amer. Electroplater's Soc. Annual Convention, Milwaukee.....June 27-30

SAE West Coast Mtg., Portland..Aug. 15-17

Conf. on Road & Motor Transportation, Geneva .....Aug. 22

Canadian Nat'l Aircraft Exhibition, Toronto .....Aug. 26-Sept. 10

Nat'l Air Races, Cleveland .....Sept. 3-4-5

Instrument Soc. of America Convention, St. Louis .....Sept. 12-16

Inst. of Traffic Engineers, Washington, D. C. .....Sept. 25-28

British Passenger Car Show, London, Sept. 28-Oct. 8

Society of Industrial Packaging and Materials Handling Engineers Annual Exposition, Detroit....Oct. 4-7

Paris Auto Show, Paris.. .... Oct. 6-16

Nat'l Safety Council Safety Congress & Exhibit, Chicago .....Oct. 24-28

Amer. Society Body Engineers Annual Tech. Convention, Detroit Nov. 2-4

Chicago Auto Show, Chicago.....Nov. 4-12

Less Weight with High Strength Steel

(*Continued from Page 39*)

weight is eliminated by use of high-strength steel. The total weight of the body is 1600 lb of which 250 lb is drawing quality carbon steel and 1350 lb is Otiscoloy.

The 250 lb of drawing quality steel used in this body is in the roof "skin" and the inner stampings on the doors. In both cases, severe deep drawing operations are required. All other sections—the upper and lower side panels, sills, pillars, complete inside lining and reinforcement, skirt and filler panels make up the 1350 lb of Otiscoloy.

In addition to weight saving, however, advantages of better rust resistance and greater resistance to abrasion in this application have particular significance. During normal operation, the interior of milk truck bodies must be steam-cleaned daily for sanitation. Even with the reduction in gage, Otiscoloy panels are said to stand up under the severe corrosive conditions in these trucks and also withstand abrasive wear which results from frequent loading and unloading.

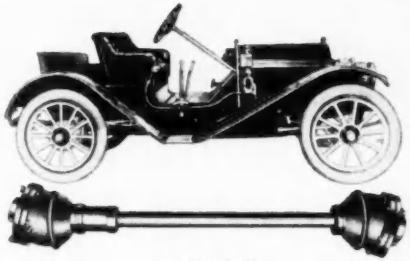
A third and slightly different application of Otiscoloy is in the production of stake body platform beds, where 200 lb of weight is eliminated by the use of 12-gage sheets, cold-formed into structural channels for the framework. In addition to corrosion and abrasion resistance, the fatigue resistance of high-strength steel contributes to service life of these bodies.

No great problems have been encountered either in the fabrication or welding of high-strength steel according to Hughes-Keenan Corp. While more force is required to form it than the same thickness of mild steel, the Otiscoloy in this case is usually two gages lighter.

Spicer

has served **Hudson** continuously for Forty Years

SPICER • HUDSON
40
Years of Continuous Service
1909 • 1949



1909



1949

Spicer has furnished the Universal Joints and Propeller Shafts *for every one* of the millions of Hudsons that has been made since 1909. It is estimated that one-quarter of these automobiles are operating today...a splendid tribute to Hudson engineering and manufacture. The exclusive use of Spicer Universal Joints and Propeller Shafts in helping attain this record is an honor of which we are justly proud. It is typical of the many accomplishments which over the past 45 years have made Spicer the "Standard of the Industry."

45 YEARS OF Spicer SERVICE

SPICER MANUFACTURING
Division of Dana Corporation
TOLEDO 1, OHIO

TRANSMISSIONS • PASSENGER CAR AXLES • CLUTCHES • PARISH FRAMES • STAMPINGS • TORQUE CONVERTERS • UNIVERSAL JOINTS • SPICER "BROWN LIPE" GEAR BOXES • RAILWAY GENERATOR DRIVES

France Shows Latest Airplanes in Paris Show

(*Continued from page 27*)

guise of railroad material and now reaching its final stage, was the SOCEMA designed in 1941 and produced since 1946. It is claimed that this has undergone 50 hour bench tests and that it will be installed on a Languedoc passenger plane. The horsepower developed at the propeller shaft is 2450 at sea level, plus 1210 lb thrust. It has a 15 stage axial compressor, an annular combustion chamber with 10 flame tubes and a single four-stage turbine. The single propeller is driven through an epicyclic 5.77 to 1 reduction gear.

With Rolls Royce absent and De Havilland showing only indirectly, Britain's turbine representation was limited to Armstrong-Siddeley and Bristol. The former showed the double Mamba for the first time. This is basically two side-by-side, 1250 hp Mamba engines driving counter-rotating, coaxial, fourbladed Rotol propellers through a common reduction gear. Each engine has its own fuel, lubrication and control systems and can be started, stopped, feathered and cruised entirely separately. There is an alternative system of using each engine to drive both sets of propellers through an overrunning clutch device. The double Mamba has an overall length of 79.83 in., an overall width of 52.8 in., and an overall height of 42.35 in. Maximum take-off at sea level is 2540 shaft hp and a jet thrust of 770 lb.

Armstrong-Siddeley also showed the single Mamba gas turbine driving a propeller through a reduction gear. Measuring only 31 in. at its maximum diameter when cowled, it develops over 1400 hp for a weight of only 780 lb. Early this year the Mamba had completed more than 7000 hours of development running, including the successful completion of a 150 hour civil and military type test and a 500 hour special endurance test.

A third model by Armstrong-Siddeley was the Python 4000 hp gas turbine driving a counter rotating propeller through a reduction gear. This model has completed 4300 hours test bed running, this including running without propellers on a Heenan & Froude water brake and running with propellers in a wing test rig designed to simulate flight conditions. In January it made its first flight installed in a Lancaster flying test bed, the outboard engines being Pythons and the inner ones Merlins.

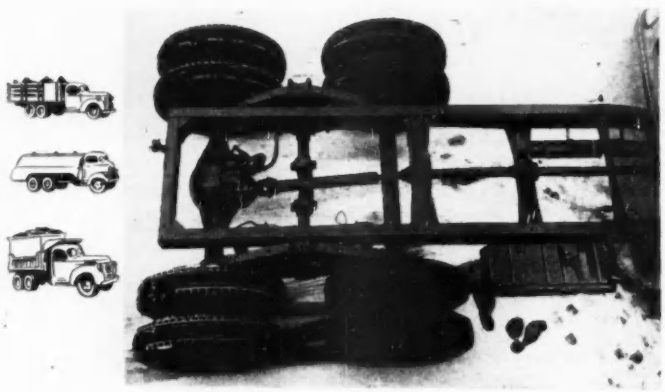
The Python has an axial flow compressor with reverse flow and compresses into 11 combustion chambers radially disposed around the compressor casing. The maximum diameter is 54.5 in., overall length 156 in., dry weight 3150 lb and estimated installed weight 4100 lb.

Bristol showed the Double Proteus as a model for eventual installation in the Brabazon passenger plane expected to make its first flights within the next two months. The single Proteus was shown complete, this unit consisting of a prop turbine with two compressors—one axial and the other centrifugal. There are eight separate combustion chambers, and two axial turbines driving respectively the propellers and the compressor. Length is 98.4 in., diameter is 37.4 in., and horsepower 3245 plus 800 lb thrust. The Double Proteus develops 6490 hp, plus 1600 lb thrust.

Hispano-Suiza, one of the few important firms remaining outside the group of nationalized aero engine factories, had 12-cylinder V-type piston engine known as the 12B. It has direct fuel injection and a centrifugal blower. It develops 2000 hp at 2700 rpm. In the official group there was shown the TB 1000 turbo-prop with a nine-stage axial-flow compressor and

(*Turn to page 64, please*)

POWERFUL LOAD BOOSTER



by DETROIT AUTOMOTIVE PRODUCTS converts 2-TON truck into HEAVY HAULER with TUTHILL *Alloy Steel* SPRINGS

This special job with TUTHILL Springs boosts payloads and profits by converting any 1½, 2, 2½ or 3 ton truck into a 6-wheel, heavy-highway-hauler. Tuthill engineers are equipped to solve your special spring problems. Write or phone them today!

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EXIDE BATTERIES put "*ZIP-AND-GO*" in Diesel engine cranking

That's because they're built specifically for the job . . . built with extra power for the toughest of off-the-highway cranking . . . built with extra ruggedness to withstand hard service, year after year, in all climates. You can always count on Exide Batteries for dependable performance, long life and low cost maintenance.

Exide engineers have a thorough understanding of Diesel cranking requirements. This has been gained from long and close association with the Diesel industry, and from more than three-score years of battery-building experience. Exide engineers will be glad to cooperate with you in applying storage batteries to fit your needs.

Exide
BATTERIES

1888—DEPENDABLE BATTERIES FOR 61 YEARS—1949

"Exide" Reg Trade-mark U. S. Pat. Off.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • *Exide Batteries of Canada, Limited, Toronto*

six combustion chambers. This has not yet been run, but its estimated performance is 1280 shaft hp, plus 570 lb thrust.

In addition to the nationalized group of engine factories, comprising Renault, Gnome & Rhone, and Lorraine-Dietrich, France had the State Arsenal, where the products appeared to be those shown two and a half years ago. The Arsenal featured a 24-cylinder, H-type piston engine, all the castings being in light alloy, with two crankshafts. One of these engines has been flight tested in the Languedoc. Another model was the inverted 12, two engines being coupled in tandem. The tandem plant now develops 4500 hp at take off, using water injection.

Among the smaller power plants shown the Lutetia radial two-stroke 122 cu in. engine was original. The layout consists of double cylinders having two different bores, and a common combustion chamber. There are two sets of six radial cylinders, each set connected up to a throw of the crankshaft, the throw of the forward cylinders having a slight angular offset from the rear set. The forward cylinders carry inlet ports which communicate directly with a centrifugal blower supplying a mixture from a normal carburetor. With a compression ratio of seven to one, it is stated that the output is 70 hp at 2600 rpm, with a weight of 132 lb. Of the same general design was a four-cylinder V model, of 3 by 2¾ in. bore and stroke, developing 36 hp at 2600 rpm, and weighing 79 lb.

Under the new name of Macamat, Mathis showed a variety of small and medium powered engines, varying from two to 16 cylinders, with the maximum number of parts in common. The largest of the series is an aircooled X-type with two crankshafts driving a single propeller, but capable of running as separate halves through the incorporation of overrunning clutches.

Diesel Applications

(*Continued from page 29*)

statistical standpoint, attention is drawn to the dotted line connecting 1941 with 1946. Neglecting the points for 1942-1945, the curve from 1939 to 1948 is practically a straight line. If this is not simply accidental, it pictures a steady rate of growth, neglecting wartime production which was largely expendable.

Fig. 2, based upon the same source, pictures the distribution of Diesel engines by percentages of total horsepower, for arbitrary ranges of horsepower classification. The significant point about this comparison of two five-year periods is the shifting of percentages from the medium hp range to engines of greater output.

Perhaps the most valuable and significant data we have observed concern estimates of yearly additions in terms of engines. These estimates show 121,000 Diesel engines (up to 250 hp rating) built in 1948. Production of 130,000 units of the same size range is estimated for 1949. That would place the population of new units at a minimum of 250,000 for the two years.

From a practical marketing standpoint, the data in Table 2 are of particular interest to the sales department. This is a tabulation of the distribution of Diesel engines (in terms of installed hp) by states. Such data are invaluable in planning a sales campaign as well as advertising and sales forecasting.

It also is possible to develop other types of information of practical value. Consider the problem of cold starting as an example. It is a serious matter in the case of engines intended for operation in sub-zero climate. If the geographic destination of an engine is known the engineering department will be in position to recommend the proper kind of accessory equipment to assure owner satisfaction. In addition, since different starting methods are available in some instances as optional equipment, the exact recommendation of the starting method best suited to the operating conditions could be made and quoted to the customer.

To this end it is possible to make some speculative estimates. Consider

(*Turn to page 76, please*)



ONE solvent, ONE price for all jobs

The new Blacosolv is the most stable solvent we've ever offered for metal degreasing. Aluminum, steel, copper and precious metals may be safely and scientifically degreased with the same solvent.

Blacosolv contains a mixture of entirely new and different stabilizers. They are not alkaline materials which neutralize acid *after* breakdown. They are new stabilizers that *prevent* solvent breakdown and possible acid formation. Contains no alkaline materials that can be mistaken for stability . . . no masking agents are added.



G. S. BLAKESLEE & CO.

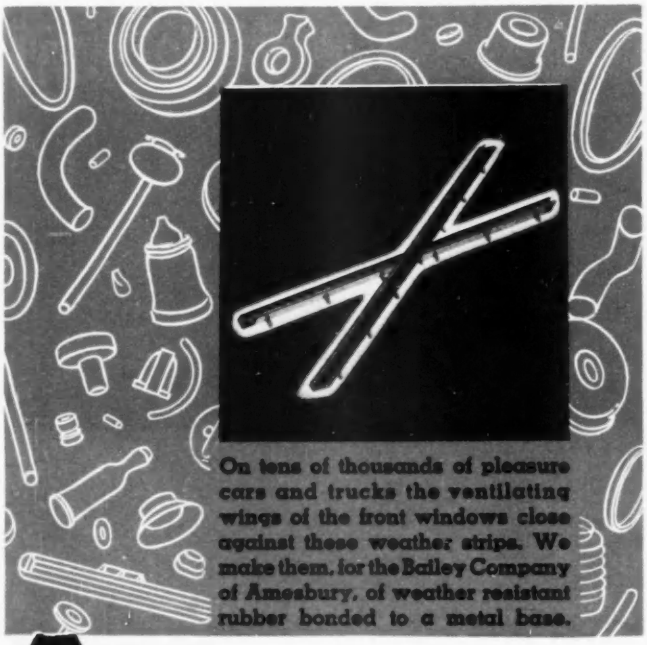
BLACOSOLV DEGREASERS AND SOLVENT

NIAGARA METAL PARTS WASHERS

G. S. BLAKESLEE CO., CHICAGO 50, ILLINOIS
NEW YORK, N. Y. TORONTO, ONT.



THESE UNITS FORM BORG-WARNER, *Executive Offices, Chicago:* BORG & BECK • BORG-WARNER INTERNATIONAL • BORG WARNER SERVICE PARTS • CALUMET STEEL • DETROIT GEAR • DETROIT VAPOR STOVE • FRANKLIN STEEL • INGERSOLL STEEL • INGERSOLL UTILITY UNIT • LONG MANUFACTURING • LONG MANUFACTURING CO., LTD. • MARBON • MARVEL-SCHEBLER CARBURETOR • MECHANICS UNIVERSAL JOINT • MORSE CHAIN • MORSE CHAIN CO., LTD. • NORGE • NORGE-HEAT • NORGE MACHINE PRODUCTS • PESCO PRODUCTS • ROCKFORD CLUTCH • SPRING DIVISION • SUPERIOR SHEET STEEL DIVISION • WARNER AUTOMOTIVE PARTS • WARNER GEAR • WARNER GEAR CO., LTD.



On tens of thousands of pleasure cars and trucks the ventilating wings of the front windows close against these weather strips. We make them, for the Bailey Company of Amesbury, of weather resistant rubber bonded to a metal base.

Tyer has been doing things with rubber for ninety-two years and during that time has made many contributions to the art. In earlier days Tyer originated white rubber and elastic webbing. During the late war Tyer's contributions ranged from giant rubber pontons to tiny ear plugs made to a tolerance of one thousandth of an inch. Since the war Tyer has resumed its leadership in service to industry. Many of the country's finest and most famous products have at one or more vital points a rubber part made by Tyer. These manufacturers know that Tyer can do unusual things with rubber.



This bonded-to-metal rubber step plate is built by Tyer to deliver the service for which Mack Trucks are famous.

If there is a rubber part in your product (old, new, or proposed) Tyer technicians will give you the utmost co-operation in putting all our experience at your service. Ask the Tyer representative. Write to us in Andover or to the nearest branch. *



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Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

General business activity turned downward during the week ended May 7. Electric power production, railway freight loadings, crude oil output and bituminous coal production were lower than in the preceding week, while department store sales and construction increased. The *New York Times* index of activity for the week ended May 7 stands at 145.4, as compared with 146.6 in the preceding week and 151.2 a year ago.

Sales of department stores during the week ended May 7, as reported by the Federal Reserve Board, equaled 333 per cent of the 1935-39 average, as compared with 286 in the week before. Sales were one per cent above the corresponding distribution a year ago, as against a preceding decline of four per cent. The total in 1949 so far reported is three per cent less than the comparable sum in 1948.

Electric power production declined during the week ended May 7 for the 14th consecutive time. The output was 3.9 per cent above the corresponding amount in 1948, as compared with a similar advance of 5.2 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 768,337 cars, 2.2 per cent less than the figure for the week before, and 12.7 per cent below the corresponding number recorded in 1948.

Crude oil production in the week ended May 7 averaged 4,896,700 bbl. daily, 25,300 bbl. less than in the preceding week, and 516,000 bbl. below the comparable output in 1948.

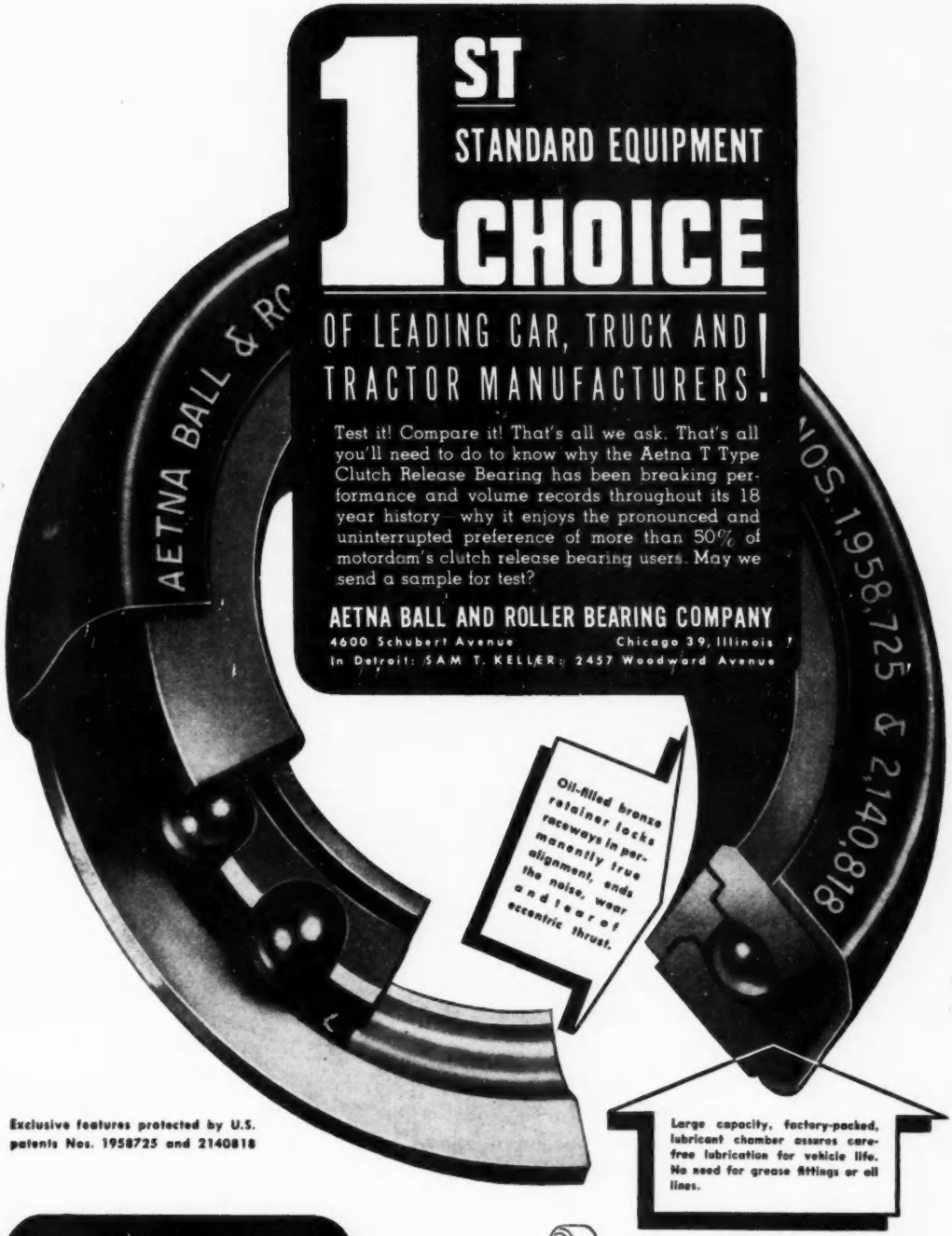
Production of bituminous coal and lignite during the same week is estimated at 11.2 million net tons, 3.1 per cent less than the output in the week before, and 3.8 per cent below the corresponding quantity in 1948.

Civil engineering construction volume reported for the week ended May 12, according to *Engineering News-Record*, was $130,991,000, or one per cent more than the preceding weekly figure, but 12 per cent below the comparable sum in 1948. The total recorded for 19 weeks of this year was 19 per cent more than the corresponding amount in 1948. Private construction for the period was 19 per cent above that a year ago, and public construction increased by 14 per cent.

The wholesale price index of the Bureau of Labor Statistics during the week ended May 10, at 155.9 per cent of the 1926 average, was 0.5 per cent more than in the preceding week, but 4.8 per cent below the corresponding figure in 1948. The advance in the general index reflected chiefly price increases in fresh fruits and vegetables.

Member bank reserve balances decreased $909 million during the week ended May 11. Underlying changes thus reflected include a decline of $1017 million in Reserve bank credit, and an increase of $5 million in money in circulation, accompanied by decreases of $77 million in Treasury deposits with Federal Reserve banks and $10 million in Treasury cash.

Total loans and investments of reporting member banks increased $320 million during the week ended May 4. A decline of $186 million in commercial, industrial and agricultural loans was recorded, marking the 16th consecutive weekly reduction. The sum of these business loans, $13,976 million shows a net decrease of $323 million in 12 months.


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STANDARD EQUIPMENT
CHOICE
OF LEADING CAR, TRUCK AND TRACTOR MANUFACTURERS!
Test it! Compare it! That's all we ask. That's all you'll need to do to know why the Aetna T Type Clutch Release Bearing has been breaking performance and volume records throughout its 18 year history — why it enjoys the pronounced and uninterrupted preference of more than 50% of motordom's clutch release bearing users. May we send a sample for test?
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AETNA BALL & RO
NOS. 1,958,725 & 2,140,818
Oil-filled bronze retainer locks raceways in permanently true alignment, ends the noise, wear and tear of eccentric thrust.
Large capacity, factory-packed, lubricant chamber assures carefree lubrication for vehicle life. No need for grease fittings or oil lines.
Exclusive features protected by U.S. patents Nos. 1958725 and 2140818
Aetna
T-TYPE Clutch Release BEARINGS
WITH THE... ...THAT TAMES TROUBLE

GMC Introduces New Heavy Duty Trucks

(*Continued from page 32*)

is cold. The thermostat is of double-acting type to shut off the by-pass and open the passage to the radiator when the engine is warmed up.

Radiator cores, mounted on a twist-free, constant alignment mounting, have greater area and depth and are more centrally placed with respect to the fan. The enlarged radiator top tank is divided into two chambers, the upper one remaining empty except during expansion and surging. A pressure relief valve seals the cooling system from the atmosphere, prevents boiling at high temperatures. A water level cock in the top tank permits easy checking of water level without removing the filler cap.

All radiator to engine connections are of fabric-reinforced bellows type radiator hose with flanged end bolting onto the fittings. This makes for leak proof, easily detachable connections.

Frames are new, with greater strength and rigidity, of straight side rail type. An underslung frame stabilizing cross member at the rear of the engine holds side rails against weave and twist. Heat treated frames are standard on the larger dump models and optional on any model from 700 up. A feature on all frames is the alligator cross member at the front of rear spring brackets; and a hat-type gussetted cross-member at the rear.

Front suspension is improved by use of front axles of wider track and heavier design, fitted with longer front springs—from five to ten in. longer—and with front shock absorbers of double-acting type standard equipment.

Front end stability is improved by the underslung cross member while steering effort is reduced by a reduction in king pin inclination. On models from 700 up, steering gears are about 25 per cent larger capacity with corresponding increase in ratio. The gear on these models also is provided with a built-in stop to prevent damage in an extreme turn on rough terrain.

The rear-axle set-up has been greatly improved, with hot-pressed steel housings replacing malleable iron in the light-heavy group of models. Hypoid gear axles are standard on models 520 through 740. Optional two-speed axles, and double-reduction axles are available for most models.

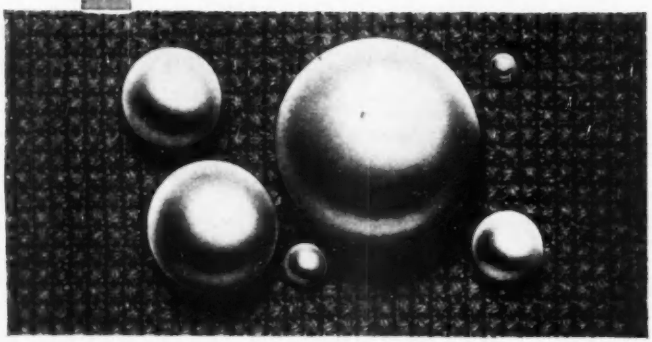
Specifically, GMC offers eight different types of read axle arrangements, depending upon the model. Hypoid single reduction is standard on models of 19,000 to 30,000 lb GVW. For power and speed requirements there is an option of either a double-reduction, two-speed axle or a planetary two-speed axle, primarily designed for tractor use. The spiral bevel double-reduction axle is used in the larger dump models, providing an extra low ratio range. For tractor and slow speed work there is the option of a hypoid double-reduction axle. Heavy, off-highway work indicates use of the dual drive, spiral bevel, double-reduction axle. A dual drive, worm single reduction unit is offered for on or off-highway service. Finally there is a dual drive, spiral bevel, single-reduction set-up with power transmitted by a torque divider containing an inter-axle differential which can be locked out by the driver at will.

The present transmissions are continued unchanged. However, the selection has been expanded to include 753 and 753A overdrive types; and 752 and 752A direct drive types for the 900 series models. Also available on the heavier models are 8031-C, H, and G, auxiliary transmissions.

Auxiliary transmissions are of three-speed type having constant mesh helical gears with sliding clutch collars.

(*Turn to page 70, please*)

IN size and spherical accuracy
perfection of surface
uniformity—dependable physical quality



NOT A BETTER BALL MADE . . .

And the service results from every Strom metal ball prove it—not only in the finest precision ball bearings but also in the lot of other ball applications where Strom balls are doing the job better.

Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.

Strom STEEL BALL CO.
1850 So. 54th Ave., Cicero 50, Illinois
Largest Independent and Exclusive Metal Ball Manufacturer



1 1897—America's first cars, hand-built and expensive, looked like this. Big questions of the day were—will it run? can I ever afford to buy one? Little thought was given to washing a car.



2 1915—Howell "Red Band" Motors arrived. The electrical horsepower age was already under way. Automobiles, as well as other goods and services, were soon to be better, cheaper.



3 1935—This combination brush and spray was one of many early car-washing devices. It wasn't until 1945 that modern assembly line methods began to be applied to the washing of cars.

NOW, A WASH WHILE YOU WAIT!



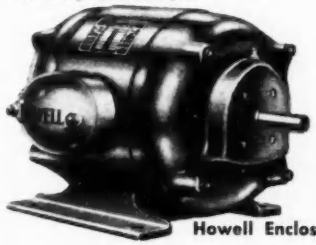
4 Today—Automatic car washers, like this, equipped with nine totally enclosed Howell Motors, turn out a glistening, clean car in a jiffy! Back-breaking labor is gone, valuable time is saved—all so that more people can enjoy better living at less cost.

Working in a shower of water is a tough job for electric motors. But, here again, Howell Motors have made good. These rugged, industrial type motors are an important source of power not only for car washing but also for fans, pumps, conveyors, dairy machines, and all other important industrial jobs.

Are you using Howell Motors? Try them!

Free enterprise encourages mass production, supplies more jobs—provides more goods for more people at less cost.

Howell totally enclosed motor built for operation in high humidity atmosphere. Remember, there's a Howell Motor for *every* industrial job.



Howell Enclosed or Splash-Proof Motor

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915

Men at Work

in the private offices and in all corners of automotive and aviation industrial manufacturing plants, influence the buying of materials, tools, machinery and equipment.

In addition to the buyers whom your own salesmen contact

AUTOMOTIVE INDUSTRIES

reaches men whose names you'll never know—but whose recommendations may mean millions to you.

Also Automotive Industries helps to create and maintain the good reputation of your product in quarters where that help will do the most good.

° ° °

Automotive Industries

A Chilton Publication

° ° °

Chestnut & 56th Sts.
Philadelphia 39, Pa.

CHECK THESE EXAMPLES OF AUTOMOTIVE APPLICATIONS FOR GAST UNITS

AIR MOTORS

Used on . . .
Crankcase Flusher
(Air Motor & Gear Pump)

• • •

Stroboscopic Distributor Test Set
(Reversible Air Motor)

• • •

Explosion-Proof Drive of Fuel Pump on Factory Production Line Carburetor Tests

VACUUM PUMPS

Used on . . .
Gasoline Heater Test Stand

• • •

Demonstrator for Simulating Auto Manifold Vacuum

HAVE YOU A NEW APPLICATION?



Gast's new booklet...
packed with ideas for Product Designers

If you design machinery—or have a part in product development—you'll find this booklet a useful idea-source. It contains data on the use of air for many common—and uncommon—applications . . . plus 26 examples of product problems that were solved by putting air to work.

Sooner or later, "Air may be your Answer" on a product design problem. *Write on letterhead for your copy of "Application Ideas".*

GAST ROTARY — AIR MOTORS • COMPRESSORS • VACUUM PUMPS
(TO ONE H.P.) (TO 30 LBS.) (TO 28 INCHES)
GAST MANUFACTURING CORP., 2 Hinkley St., Benton Harbor, Mich.

They are available in underdrive, direct drive, and overdrive versions and, in combination with five-speed transmissions, provide a range of 15 speeds forward.

With the new design, rear spring shackles of heavier models are mounted on easily-removed stub shafts, making it possible to effect shaft replacement without removing brackets.

Models above 650 series have cast I-beam type rubber bushed rear spring radious rods, requiring no greasing.

Standard hydraulic brakes on models 520 through 720 are of two-cylinder, Hi-tork type with both shoes forward acting. Brake lining and drum areas on these models are equivalent to the former so-called mountain type brakes. Hydrovac power units are supplied with hydraulic brake models.

Air brakes are standard on models 740 and up; optional on all other models. The air brake application valve has larger passages for faster action. Air brake jobs are provided with dual air tanks of larger capacity. Air is pumped from the first tank by the compressor and drawn from the second in braking, thus keeping the second tank free from water and condensation.

Tru-Stop vertical pull up hand brakes are standard on models 620 and 700 and up.

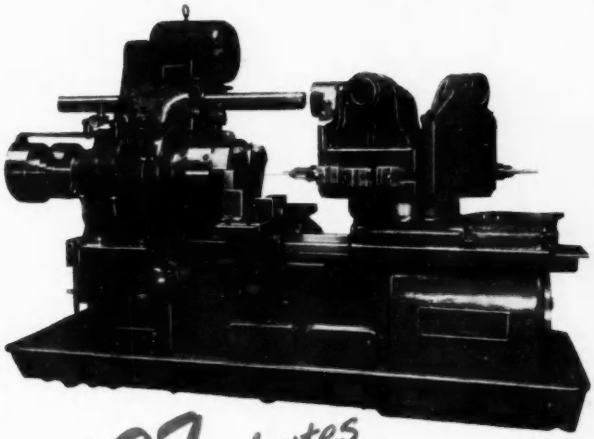
Coming to the cabs, there is a new cab for conventional models 520 through 650. A larger, super heavy duty cab is mounted on conventional models 700 up. All COE's from model 520 and up have a new heavy duty cab. Cabs are of all steel construction with more room and greater visibility. Rear corner windows are standard equipment on the super heavy duty cab, both conventional and COE; optional on conventional cabs in the 520-650 Series. A pair of center windows also can be fitted as an option on big cabs.

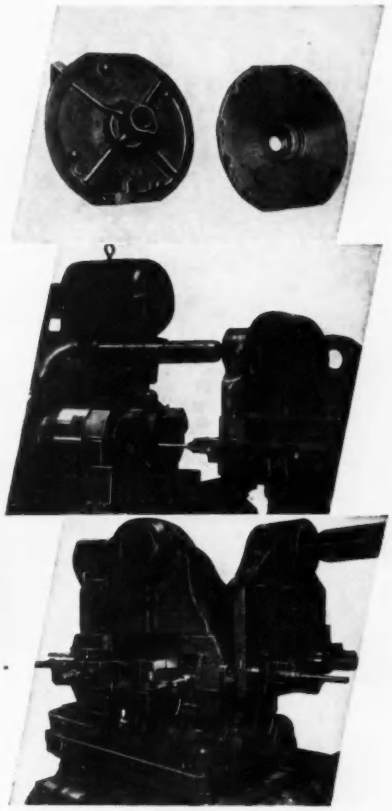
Accessibility has been given painstaking attention in the design of the new models. Hoods are wide opening, while fenders and floor boards are removable, to facilitate major repairs. Hoods are hinged at the center on conventional models; hinged at the rear on COE's. The steering gear is mounted outside the frame to facilitate servicing on larger conventional models and all COE's.

On COE's and larger models, the battery, Hydrovac cylinder, air brake valve, and other items are readily reached simply by opening the cab door. The oil dip stick on COE's is reached through a trap door, permitting the driver to check oil level without leaving the seat.

In conventional models of the larger series and on all COE's, pedals are readily removable to permit removal of floor and toe boards. This gives access to clutch, transmission, and parking brake mechanism on conventional jobs; and access to the generator, oil filter, and other engine units on COE's, in addition to those items exposed by removal of the engine cover.

2 at a time
$AVES TIME





4.37 minutes on the P&J 5D2-15 AUTOMATIC

Responsibility for performance of this calibre rests with P&J tooling experts. They know how to engineer the tooling to produce duplicate parts in minimum time, accuracy considered.

In this case there are fifteen operations on each of two pieces in the remarkable floor-to-floor time of 4.37 minutes. This gives you an idea what the P&J 2-spindle Automatic — with turrets and slides tooled the P&J way — can do for you. Send us your prints or parts for estimates.

SEQUENCE OF OPERATIONS
AS TOOLED BY POTTER & JOHNSTON

1st TF — Rough bore three diameters. Face shoulder.

2nd TF — Rough face front side, divided cut.

3rd TF — Finish bore three diameters. Form bevel. Machine 3.009" diameter.

4th TF — Finish face front side. Machine groove in bore.

5th TF — Ream three diameters.

Potter & Johnston Company
Pawtucket, R. I.
subsidiary of Pratt & Whitney
Division Niles-Bement-Pond Company

P&J

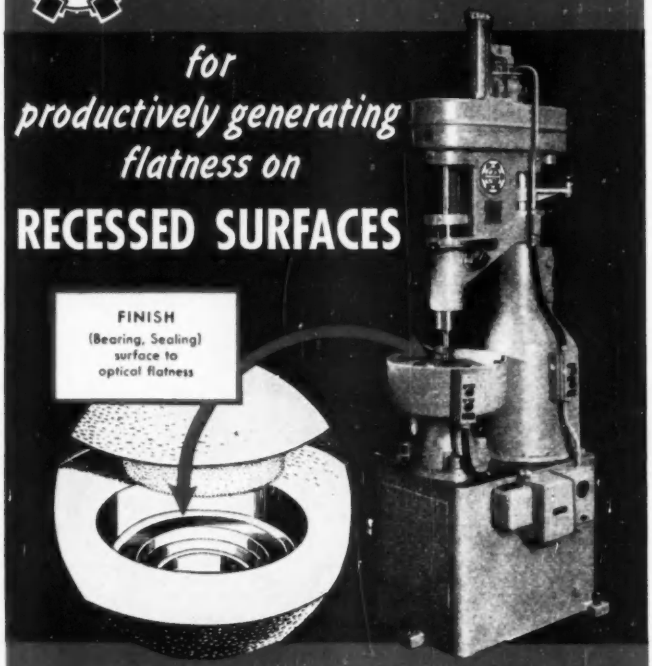
AUTOMATIC TURRET LATHES

MICRO MATIC

MICROFLAT

for productively generating flatness on

RECESSED SURFACES



● Microflat machines may be equipped to finish recessed surfaces.

The location of a surface does not limit the application of the MICROFLAT machines. Any surface that can be machined can be finished with this equipment. The surface finish and flatness generated can be controlled and held to any specified requirement.

The machine shown above is equipped with a timer and an air cylinder. The operator loads the part into the fixture and starts the cycle. The fixture rotates, the bonded abrasive finishing surface oscillates and rotates. At the end of a predetermined time cycle the spindle automatically withdraws. Production is 300 pieces per hour.

MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVENUE, DETROIT 4, MICHIGAN

236 Industrial Plants Available

(*Continued from page 43*)

other 865 had been tagged. Another 8000 pieces of equipment now appears to be the limit probable. However, this is apart from the JANMAT program which was authorized under previous legislation, Public Law 364, to garner some 190,000 items for about the same purpose. To date, some 130,000 have been tagged by JANMAT, of which nearly 100,000 have been shipped for storage. Only three machine tool plants financed by the government remain in the NIR—one leased and two sold. All are subject to the NSC.

Such plants as are in operation under the NSC may be presumed to be well-maintained. But about 80 additional plants in varied categories have been or are to be made subject to the NSC. About a score have been turned over to FWA but the remainder have not yet been certified as undisposable and transferred to that agency. Only limited funds are available for upkeep of the latter and acceleration is making the lay-away program expensive—and the plants are rapidly deteriorating.

Compact Paint Shop Facilities

(*Continued from page 35*)

ovens are gas-fired and the exhaust system so designed as to recirculate part of the oven atmosphere.

Also noteworthy is the fact that Willys has initiated a drive (since the installation of the new equipment) to raise the level of quality to the best passenger car practice for all types of bodies. To this end the heating cycle in the prime and finish-coat baking ovens is automatically controlled to extremely close limits for normal paint shop practice. The temperature range for each of the paint ovens mentioned above is held accurately to a maximum variation of 5 F, although it is probably closer to 3 F.

As mentioned earlier, it is significant, that the entire paint line described here is mechanized and arranged with noteworthy economy of floor space. A single monorail conveyor threads its course from where bodies are hung on hooks in the metal finishing department to where the color-finished bodies leave the second oven and are ready for transport to the final assembly line. Incidentally, the work remains on this 1350-ft conveyor from start to finish.

Read
AUTOMOTIVE INDUSTRIES
Regularly & Thoroughly



for your information

the BULLARD complete line

CUT MAS-ER VERTICAL TURRET LATHES

MAN-AU-TROL VERTICAL TURRET LATHES

MAN-AU-TROL HORIZONTAL LATHES

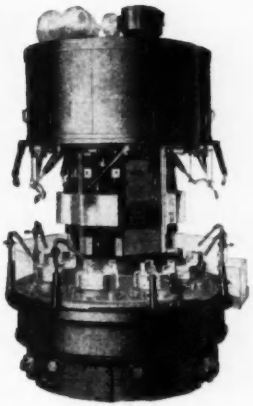
MULT-AU-MATIC Type "D"

CONTIN-U-MATIC Type "A.D." "A.D.H."

MULT-AU-MATIC Type "K"

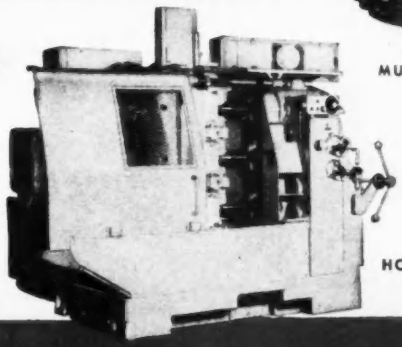
BULLARD SPACER 2 Sizes

BULLARD UNIVERSAL BORING MACHINE



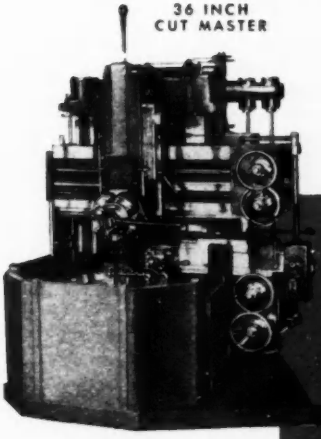
TYPE "D" MULT-AU-MATIC

BULLARD



30-H HORIZONTAL LATHE

36 INCH CUT MASTER



THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

NOW...

LIFE-LINE

slashes a-c motor upkeep costs

Here's how Life-Line motors can save you half the upkeep cost, and more.

A recent survey of 114 large motor users—operating 131,626 a-c motors of 1 to 50 hp—shows how much motors *really* cost when you figure actual "Life Cost".

The survey shows that the yearly average cost of periodically lubricated motors was $270 for every hundred motors installed.

On lubrication cost alone, Life-Line motors saved this $270. That's because Life-Line requires no periodic lubrication—no added lubrication of any kind.

The survey also indicates that the yearly outage cost per hundred motors, for repairs and lost machine and man-hours, was $960.

The record of 500,000 Life-Line motors in service, to date, indicates a failure rate averaging less than half that of conventional motors covered by this survey. This means over 50% indicated reduction in motor outage costs—in short, a possible saving of $480 per year with Life-Line.

Add these savings—$270 for lubrication plus $480 for outages—and the result is $750 per hundred motors per year.

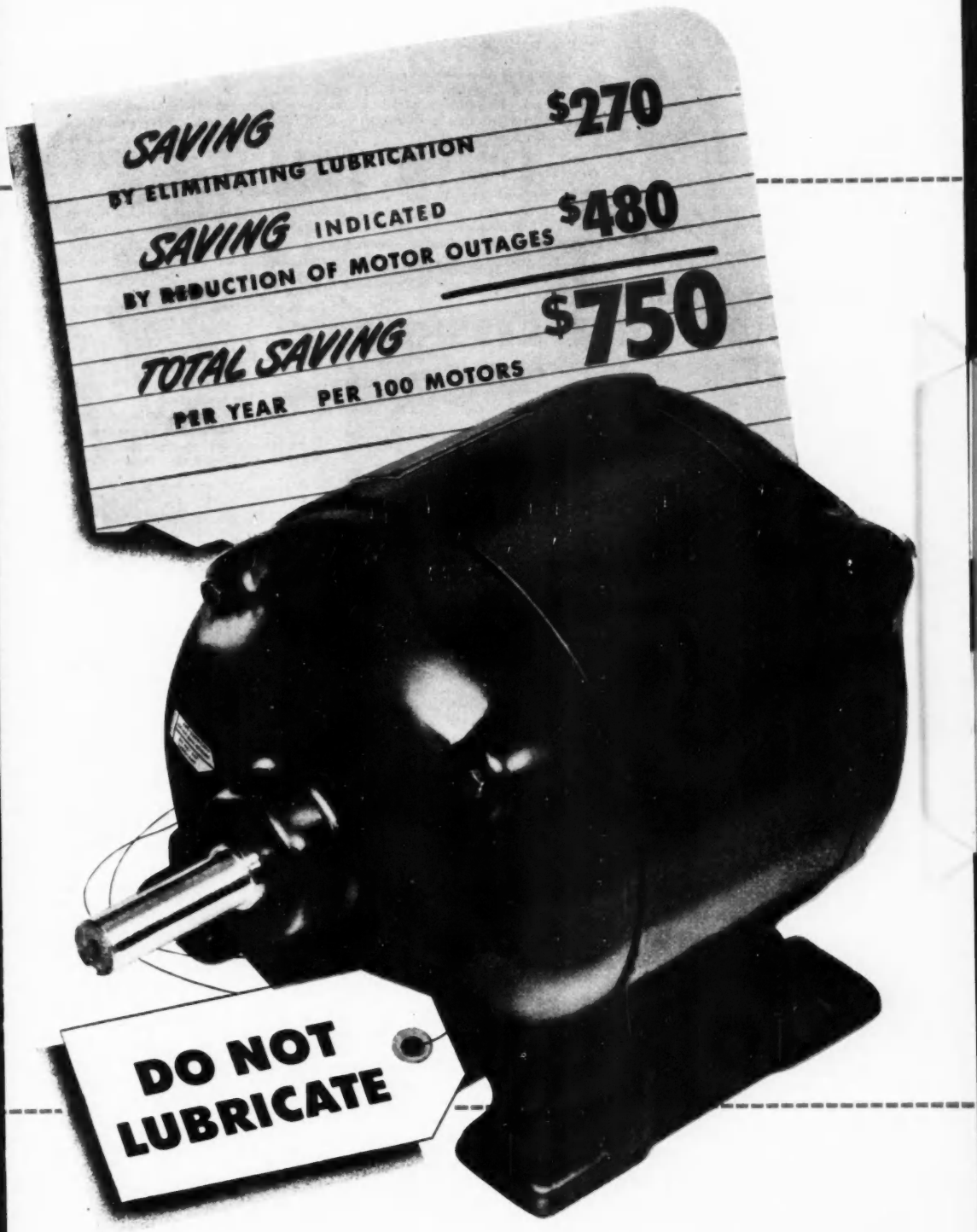
Can you afford to pass up savings like these? Get the facts on the savings possible in your plant. Ask your nearby Westinghouse representative for a copy of B-4321 "How to Cut Motor Costs $750". Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-21508-D

Westinghouse

Life-Line

Motors


SAVING
BY ELIMINATING LUBRICATION
$270
SAVING INDICATED
BY REDUCTION OF MOTOR OUTAGES
$480
TOTAL SAVING
PER YEAR PER 100 MOTORS
$750
DO NOT
LUBRICATE

Publications Available

(*Continued from page 54*)

sion joints in copper and stainless steel construction.

A-169 Forgings

Pittsburgh Forgings Co.—A pictorial review of various forging operations in the manufacture of automotive parts, is contained in a new 64-page, 2-color booklet. Pictures trace forging procedure, handling of raw material, shearing, die preparation, forging, trimming, cooling, cleaning, and related operations. A historical background of the company is briefly sketched and engineering and production controls are described.

A-170 Presses

The Bellows Co.—Bulletin No. P-400 describes Air Powered Impact and Arbor Presses. The various model presses are illustrated, design is discussed and specifications are included.

A-171 Air Motors

The Bellows Co.—Bulletin BM20-R shows the various types of Bellows Air motors. Included also are descriptions of Air Motor accessories. Specifications and diagrammatic illustrations are given for each model air motor.

A-172 Grinder-Miller

Precise Products Co.—A new folder describing the Precise Super 40 gives views of the grinder used in various jobs, describes the features, and the new Super 40 in sets. Also available is a price list and specifications for the Super 40 and attachments.

A-173 Retaining Rings

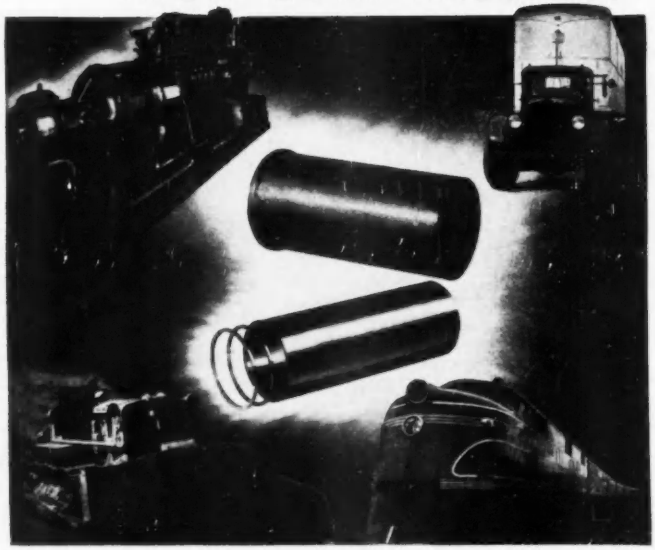
Waldes Kohinoor, Inc.—A new booklet (ERD 1001) provides a comprehensive presentation of the characteristics of the Truarc Beveled Ring, engineering specifications, formulae and other data of interest to product designers and production and maintenance engineers.

A-174 Industrial Elevators

Barrett-Cravens Co.—Bulletin 10482 presents the comprehensive line of Barrett elevators and portable cranes. The bulletin is illustrated and contains information and specifications on the various models in this line.

When it's a problem of

HIGH COMPRESSION



Engines NEED Centralloy!

NEW ELECTRIC ALLOYS

CYLINDER SLEEVES, PISTON RING POTS

Yes, more and more builders of high compression engines (and Piston Ring manufacturers) are specifying CENTRALLOY for cylinder sleeves and piston rings — find CENTRALLOY solves their problems of breakage, extreme heat and wear. One reason — piston rings of CENTRALLOY retain full properties at temperatures upwards of 1000°F.

Contact the Centrifugal Foundry Co., Muskegon Hts., Mich. for brochure of complete specifications of 6 great alloys and/or sample castings.

CHECK THESE ADVANTAGES OF CENTRALLOY

- Low Cost
- Low Scrap (approx. 2%)
- Greater Concentricity
- Greater smoothness of stock
- Unexcelled Strength
- Extremely Long Wearing
- Normally Unbreakable in Service
- Excellent Machinability

Centralloy

CENTRIFUGAL FOUNDRY COMPANY Muskegon, Michigan

Centrifugally cast electric alloys — exclusively heat-treated for Super Duty

Diesel Applications

(*Continued from page 64*)

Table 3. The region outlined in this tabulation is the so-called cold weather belt in the U. S. as generally defined by the automotive industries. Assuming that the distribution of Diesel engines as shown in Table 2 is about the same as it was in 1937 (for want of current data) the tabulation shows that between eight and nine per cent of engine population is found in the ordinarily rugged sub-zero belt. Moreover, it gives an estimate of the approximate percentages in each of the selected areas.

Engines going to such localities not only require special accessories for cold starting but special recommendations for fuels and lubricants as well.

Some students of the marketing field believe that when authoritative statistics based upon actual sales are available on an industry-wide scale, there will be a better appreciation of the potential market for Diesel engines.

Classified Advertisements

Newly forming sales organization with extensive following in the automobile trade in Metropolitan New York seeks items on an exclusive basis. Box 65, Automotive Industries, 5601 Chestnut Street, Philadelphia 39, Pa.

MANUFACTURER WANTED for adoption of new type small diesel engine, 5-7 HP for quantity production. Design, which opens larger fields of use, is backed by long experience and actual experimental engine results.

This engine requires standard production methods and is rugged, yet smaller, lighter, and of lower cost than the few competitive diesels of similar size on the market, and it meets a great demand.

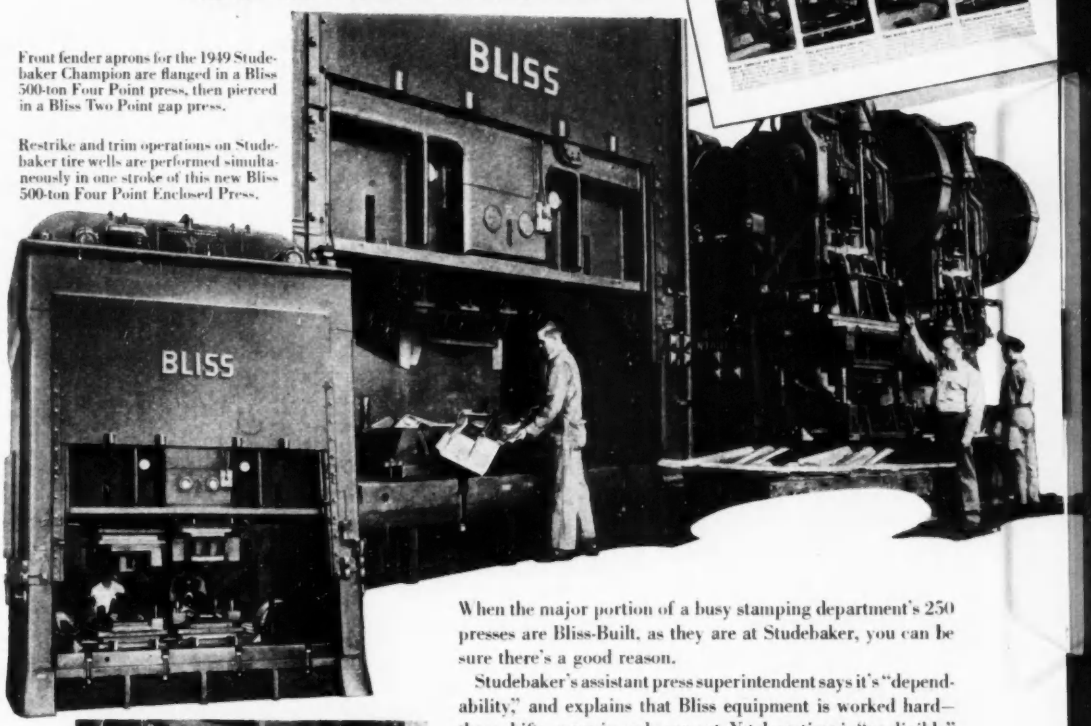
Only directly interested parties.—H. G. Spier, 463 Emerson Avenue, Hamilton, Ohio.

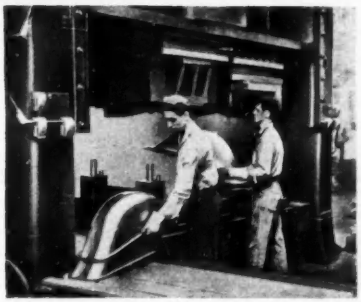
...and BLISS is the press buy word at Studebaker



Front fender aprons for the 1949 Studebaker Champion are flanged in a Bliss 500-ton Four Point press, then pierced in a Bliss Two Point gap press.

Restrike and trim operations on Studebaker tire wells are performed simultaneously in one stroke of this new Bliss 500-ton Four Point Enclosed Press.





Double die set-up in another 500-ton Bliss press for restriking and trimming tire wells.

When the major portion of a busy stamping department's 250 presses are Bliss-Built, as they are at Studebaker, you can be sure there's a good reason.

Studebaker's assistant press superintendent says it's "dependability," and explains that Bliss equipment is worked hard—three shifts—year-in and year-out. Yet downtime is "negligible."

Such dependability begins with the prompt and practical on-the-scene assistance that Bliss engineers bring to the working-out of a pressed-metal problem—in matching the press to the job for maximum, low-cost production. And back of it is Bliss' 90-year fund of press-building knowledge, built into its complete line of mechanical and hydraulic presses.

That's why at Studebaker, as among so many major mass-producers, the buy word for presses is "BLISS."

You'll like talking over your pressed-metal problem with a Bliss Sales Engineer. Why not call him in now?

E. W. BLISS COMPANY, TOLEDO 7, OHIO

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY IN THE WORLD

BLISS BUILT


design
FOR ECONOMY
FOR UTILITY
FOR APPEARANCE
Industry is constantly finding new applications for aluminum and brass extrusions • There is no limit to the intricate designs we can produce in our modern plants • Let us show you how extruded shapes and products fabricated from extrusions can increase production and lower assembly costs.
EM
EXTRUDED METALS DIVISION
DETROIT GASKET & MANUFACTURING COMPANY
DETROIT 23, MICHIGAN

TOUGH!

—high fatigue strength, high tensile strength, withstands extremely high working loads

HARD!

—can be oil quenched to a maximum hardness of 64/66-Rockwell C in moderate sections.

EASY TO MACHINE!

—has fully spheroidized structure.

IDEAL FOR PARTS LIKE THESE:

1. Diesel injection pumps
2. slitting rolls and knives
3. machine tool parts
4. mill rolls
5. mechanical seals
6. cam rollers for automotive steering gears
7. lathe centers
8. pump parts
9. saw mill rollers
10. asbestos disintegrators
11. anti-friction bearings
12. aircraft engine parts

—that's TIMKEN® 52100 steel!

DEVELOPED originally for the anti-friction bearing industry, Timken® 52100 steel offers important advantages for any machined part requiring great strength and high resistance to wear.

The properties listed above are uniform in every lot of this high carbon chromium steel. This uniformity is insured by The Timken Roller Bearing Company's close quality control from melting through final inspection.

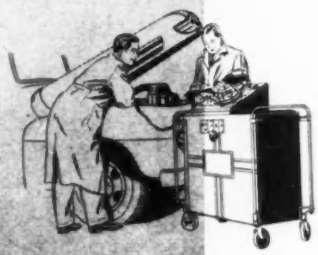
The Timken Company is one of the world's largest producers and the *only* source of 52100 steel in three finished forms—bars, tubes, and wire. There's a wide range of sizes in each form to meet your needs. And for small run or emergency orders, 101 sizes of Timken 52100 tubing—from 1″ to 10½″ O.D.—are available for immediate shipment from our mill stock.

Our Technical Staff can give you full information on Timken 52100, and will be glad to help you with your application. Write for 52100 Tubing Stock List. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

50th birthday of the company whose products you know by the trade-mark: TIMKEN



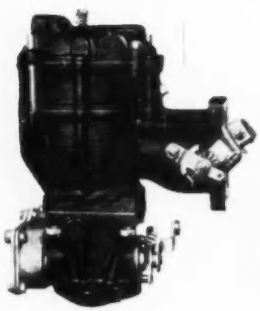
Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.



Whether Carburetor Efficiency Is Measured In Miles Or Years

Zenith

is the Engineers' Choice!



On new trucks making their first runs or on old vehicles with years of service, the record of Zenith* Carburetors is the same—better performance and lowered operating costs. You'll find that consistently good fuel mileage only emphasizes the year-in, year-out efficiency of Zenith Heavy-Duty Carburetors. There are many reasons why it pays to specify Zenith, the engineers' choice for top performance over the years.

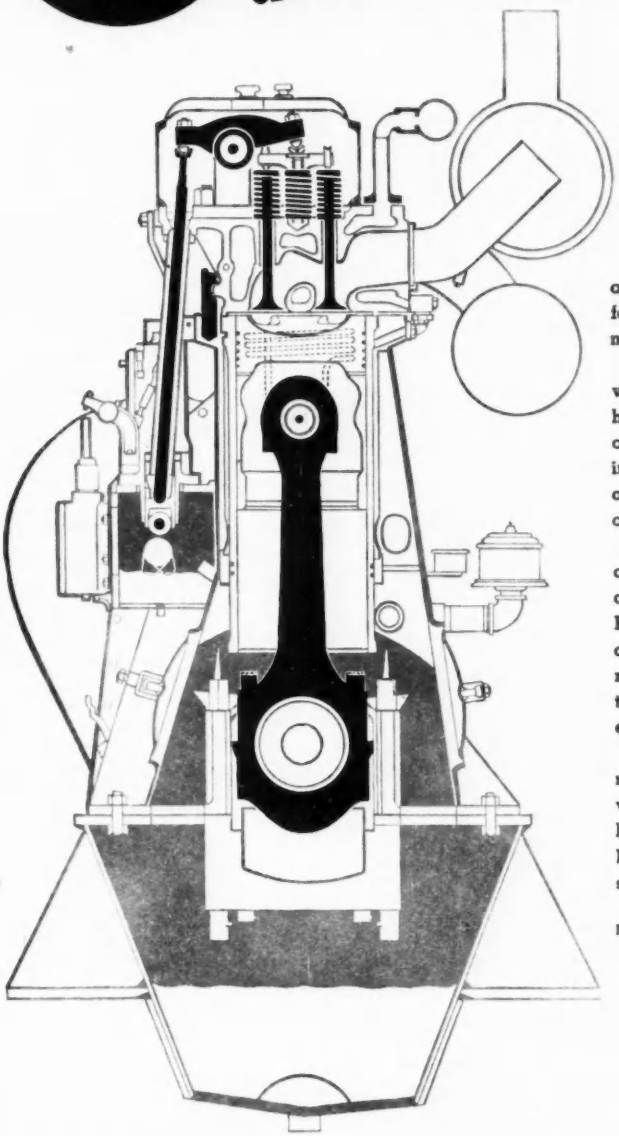
*REG. U.S. PAT. OFF.

ZENITH CARBURETOR DIVISION OF Bendix AVIATION CORPORATION

696 Hart Avenue • Detroit 14, Michigan

MANUFACTURERS OF FINE CARBURETORS AND FUEL FILTERS

inside story of diesel dependability



The diesel engine parts emphasized in the cutaway drawing are usually made from alloy steels. They are the rods, pins, bolts, springs, rockers, and valves that are largely responsible for the dependability and efficiency of modern diesel power.

In many of these parts alloy steel provides the added strength to take the higher stresses encountered in this type of engine. In other parts it furnishes the increased resistance to corrosion, to heat, and to wear, needed for long trouble-free operation.

Bethlehem produces the high-grade alloy steels used for diesel parts by many of the nation's leading engine builders. From start to finish, the uniformity and quality of Bethlehem alloy steels are rigidly controlled. Every known precaution is taken to see that they meet the exacting requirements of the industry.

In addition to manufacturing the full range of AISI steels Bethlehem also provides metallurgical assistance to diesel builders. Our metallurgists are glad to help with any problems concerning analysis, heat-treatment, forging or machining.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

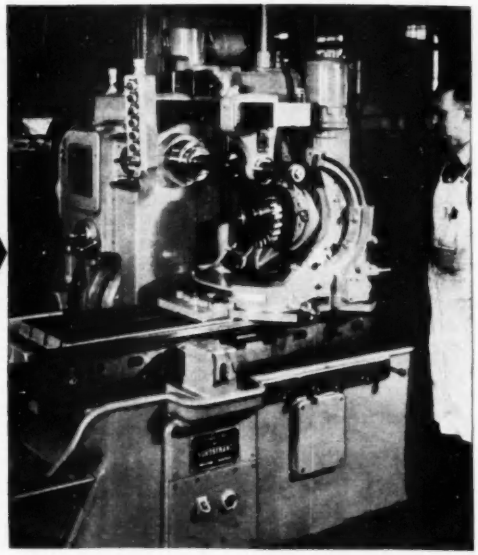
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM ALLOY STEELS

YOU'LL GET PRACTICAL MILLING METHODS LIKE THESE WITH SUNDSTRAND "ENGINEERED PRODUCTION"







Basically, there are two approaches to solving milling production problems, (1) obtaining standard machines, then trying to process parts over these machines as economically as possible, (2) designing the most profitable processing method, then obtaining machines to suit this method — standard or semi-standard machines, if possible, or entirely special machinery, if necessary.

The latter method is Sundstrand "Engineered Production" . . . the most practical approach to economical milling. The following is a brief resume of the complete engineering and manufacturing service available from Sundstrand to meet any of your production milling requirements.

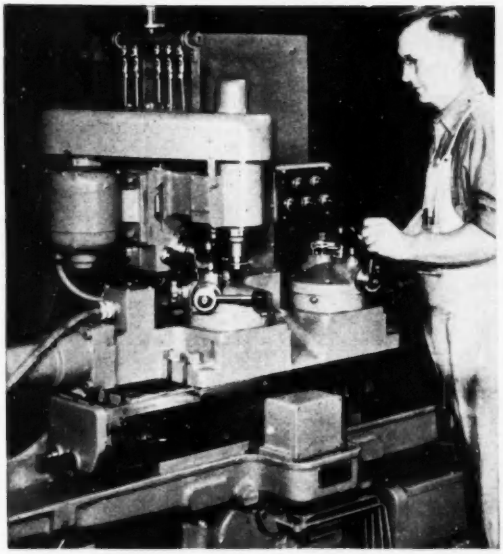
These actual examples are presented to reveal one of each of the methods used in solving milling production problems. One of these methods may be the solution to your present problem.

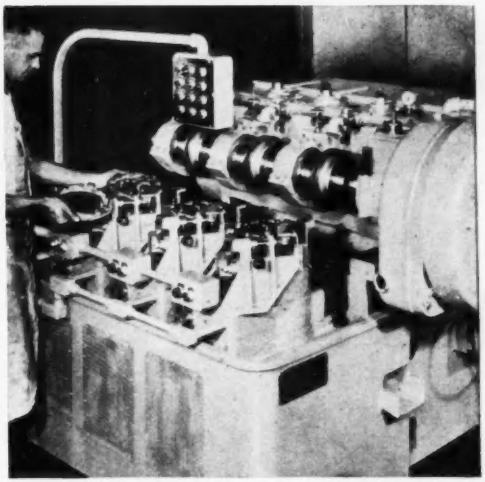
1 Milling Blade Slots and Chip Clearance in Cutter Bodies with a Standard Rigidmil

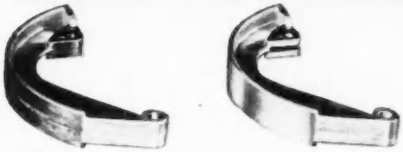
Here's a practical solution to milling a large number of different size parts requiring similar operations. These milling cutter bodies come in small lot sizes from one to eight. They require milling cuts on both the face and O.D. The machine used is a standard Sundstrand Model 33 Rigidmil with a power operated elevating attachment for positioning the head. A universal automatic index fixture was provided in order to handle the wide range of cutter body sizes. This index unit handles automatic spacing from 2 to 40 spaces . . . can be adjusted vertically thru 110° (from 10° below horizontal to 10° past vertical) and thru 90° horizontally (45° each side of the centerline of the table). Compared to the former method, this Sundstrand equipment reduced the machining and set-up time for these operations from 19.2 to 10.4 hours on a total of 30 parts of 8 different sizes.

SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U.S.A.

RIGIDMILS • FLUID-SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT









2 Standard Rigidmil with Special Head Mills 145 Brake Shoes Per Hour

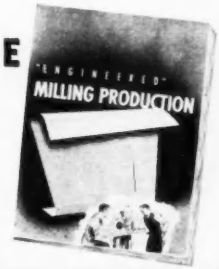
This Sundstrand Rigidmil is provided with a special high speed head equipped with one vertical and one horizontal spindle. Each spindle has endwise adjustment, and the horizontal spindle is provided with automatic retraction. Two power operated rotary tables are timed and interlocked with the automatic table cycle for rotary milling of the face and slot in washing machine brake shoes. Manually clamped fixtures hold the part for a cycle of load and unload at one end while milling at opposite end. Production is approximately 145 per hour.

3 Special Rigidmil Mills Over 250 Clutch Plates Per Hour

This special traveling head Sundstrand Rigidmil mills the top and both sides of three lugs on various sizes of clutch plates at a rate of one completed part per machine cycle. The machine operates in an automatic cycle started by push button. It has three work-holding stations each with a three position automatic index fixture. At the end of each cycle of the head, the work part at one station is automatically unclamped, manually unloaded and loaded, and automatically clamped. One part is completed with each cycle, and production obtained is approximately 250 pieces per hour.

More Proof...FREE

Write for more proof of the successful application of Sundstrand "Engineered" milling production. This 40 page book contains over 35 actual problem solutions together with interesting tooling diagrams. Write for your copy today. Ask for Bulletin No. 284.



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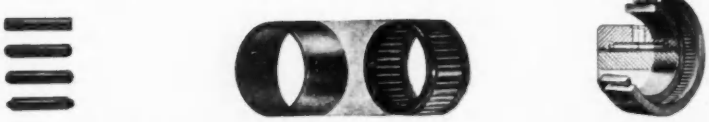
IT'S THE ROAD TO SUCCESS...

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NEEDLE CARTRIDGES
AND
NEEDLE BEARINGS
WITH NEEDLE RETAINERS

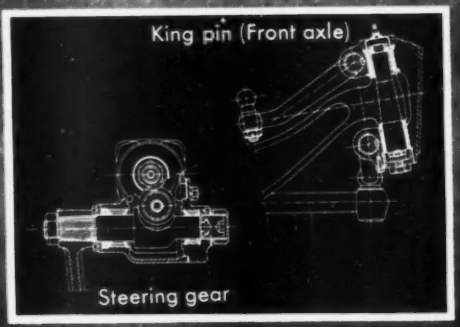


FOR THE AUTOMOTIVE INDUSTRY

loose needles | needle cartridges | complete bearings

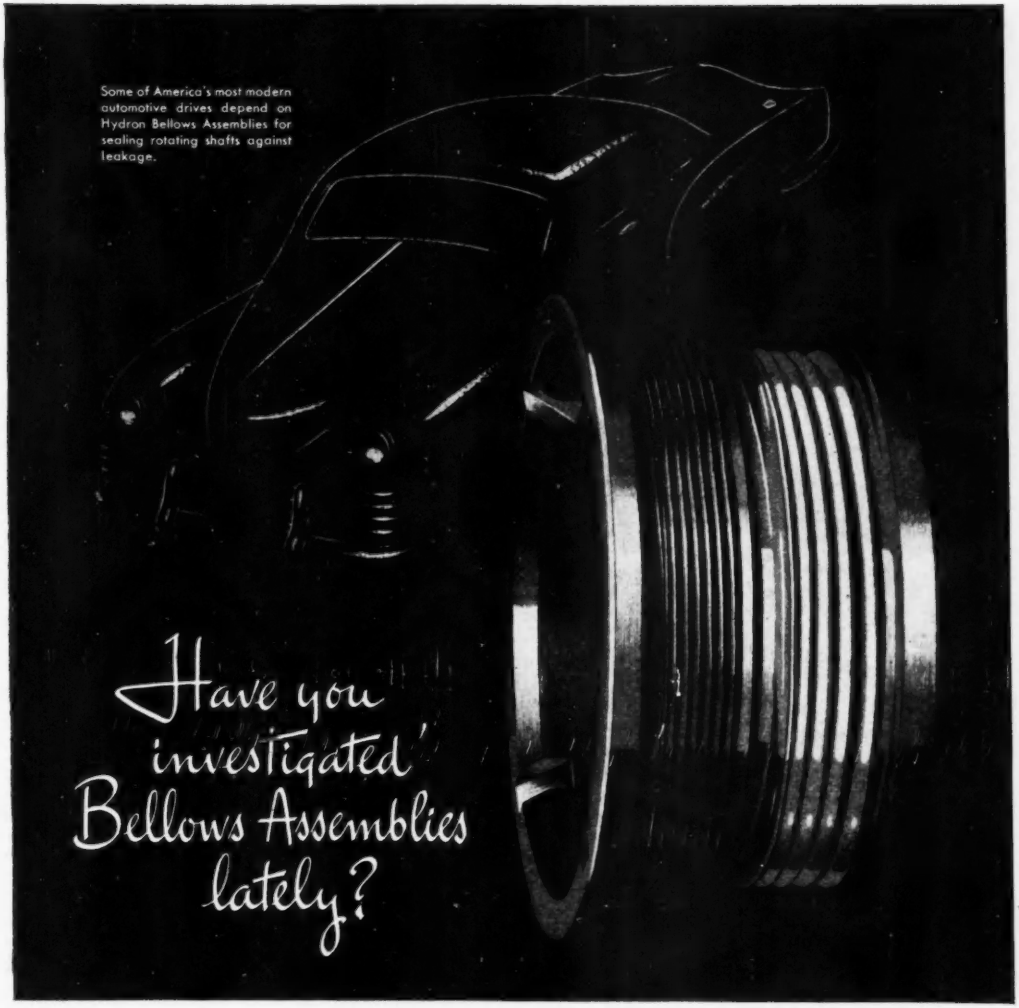


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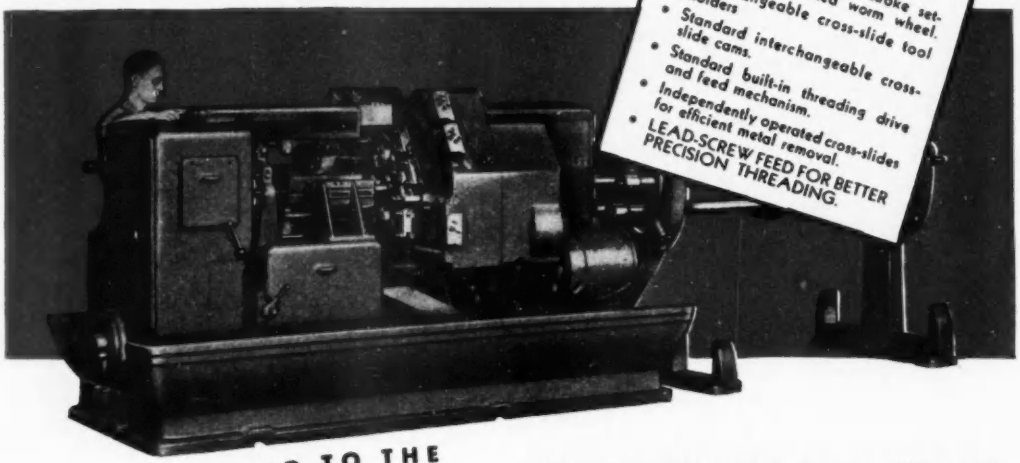
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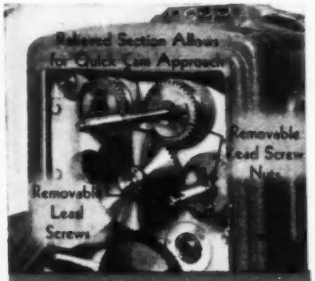


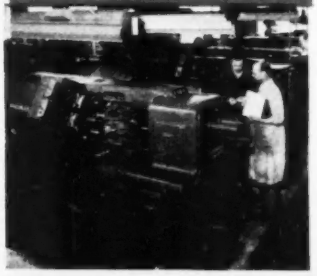
LEAD-SCREW FEED FOR *Better* PRECISION THREADING....



HAS BEEN ADDED TO THE OUTSTANDING FEATURES OF GREENLEE "6"

AUTOMATIC SCREW MACHINES





(Above) End gear box cover removed, showing lead screw threading spindle drive shafts in 4th and 5th positions. (Below) These Greenlees produce industrial hose couplings and fittings at Anchor Coupling Co., Libertyville, Ill. Front machine has lead screw feed.

Operators on Greenlees have plenty of elbow room to work in the tooling area, for changing tools, making adjustments, checking work during set-up, etc.

Change-overs are speeded by a quick and easy adjustment for the main tool-slide stroke. No cams to struggle with—just a simple setting to make on a graduated worm wheel.

Tool-holders for the cross-slides are interchangeable so any tool fits all cavities.

Feed-setting on cross slides is fast and simple, using standardized and interchangeable cams — any of which will fit any slide.

Cam-controlled threading feed is a *standard built-in feature* on Greenlees, including built-in drive sleeves in four positions.

Cross-slides are independently operated — permitting the set-up man to select from a wide variety of tooling arrangements and make adjustments as necessary.

AND NOW an extra feature to meet modern production demands — LEAD SCREW FEED for extra power and precision on threading operations. The mechanism can be added to most existing Greenlees at low cost.

FREE LITERATURE

Learn more about these and many other valuable Greenlee features that make this machine "The Operator's Favorite". Write today for bulletins — ask for Screw Machine Literature.



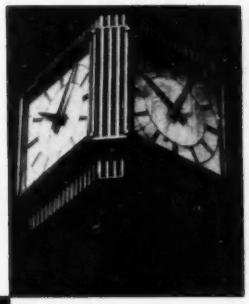
PRODUCTION MACHINERY

GREENLEE

GREENLEE BROS. & CO., 1756 MASON AVE., ROCKFORD, ILLINOIS

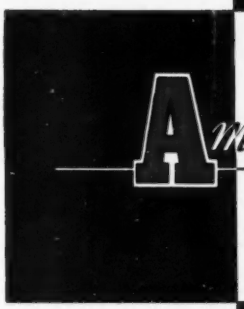
MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

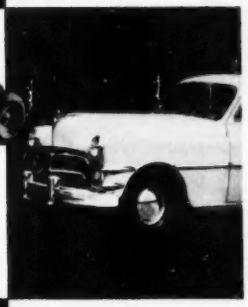


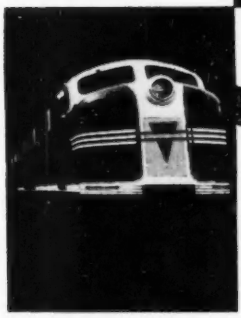


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of the places
where you'll find

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And the chances are that where you find equipment with American Quality Springs, you'll hear some mighty enthusiastic reports about product performance. For these carefully-made springs have done outstanding jobs under all kinds of adverse (as well as everyday) operating conditions.

In some applications American Quality Springs have been subjected to high stresses. In others they have been confronted with severe corrosive conditions. Still others have placed them under extreme changes of temperature. Yet they have maintained for years, an enviable reputation for *doing the job right*.

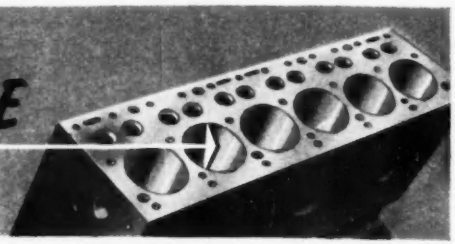
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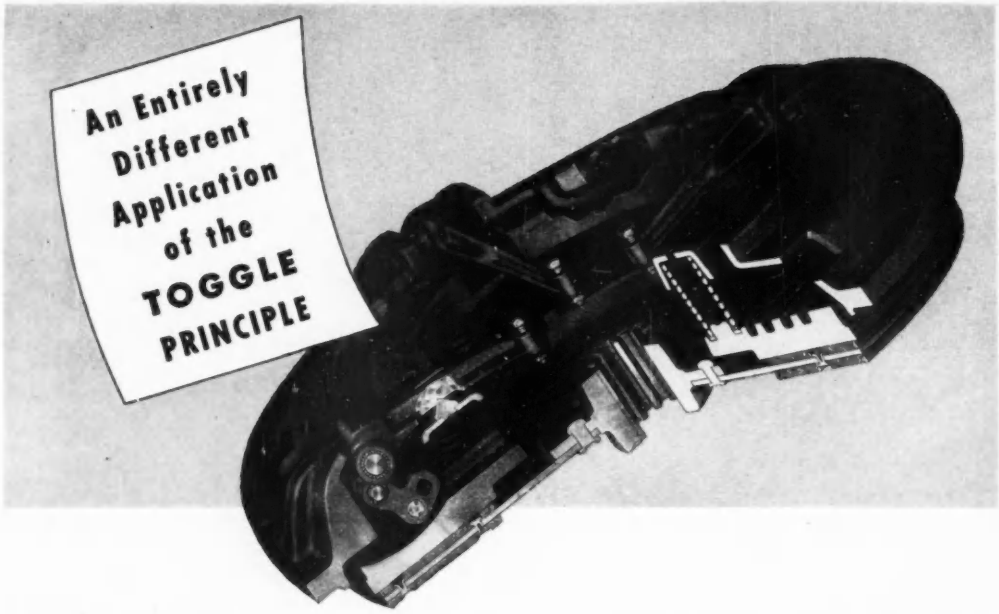
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Based on an entirely different application of the toggle principle, this LIPE constant-capacity CLUTCH compensates for wear of friction material . . . compensates for fading pressure of expanding springs . . . never loses torque capacity while there is a reasonable amount of friction material left to hold. The constantly increasing leverage of the toggle—which never goes over center—builds up pressure in almost direct ratio to these losses.

Toggle Action Insures Smooth Engagement

Despite its multiplied pressures and positive drive, the engagement of this clutch is gentle and clatter-free. This is due (1) to the fact that the initial energy of the springs is partly absorbed by the toggles and (2) to the fact that the rate of engagement is slowed by the reduced speed of the toggle as it approaches center.

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- ✱ Automatically compensates for fading pressure due to spring expansion and fatigue
- ✱ Automatically balances variable pressure of individual springs
- ✱ Inertia displacement of spring-equalizing ring cancels out cyclical and torsional vibration
- ✱ Balanced spring pressure constantly maintains parallelism of pressure plate
- ✱ High thermal efficiency dissipates heat rapidly
- ✱ Internal cooling protects springs from overheating and loss of temper
- ✱ Automatically compensated pressure needs no adjustment
- ✱ No special tools required for servicing in the field

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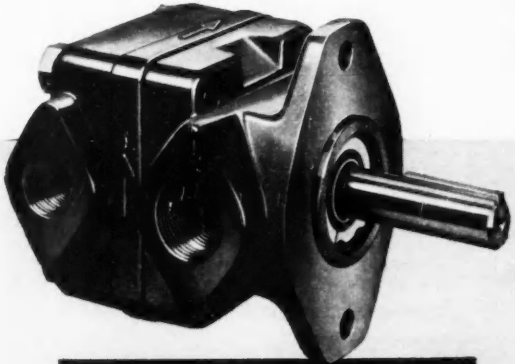





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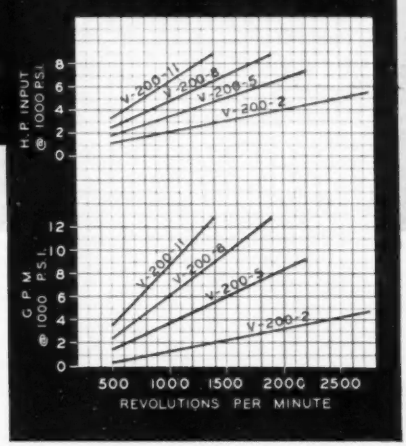
For many installations the nominal rated capacity of the pump is adequate, making it unnecessary to select the next larger size to provide additional capacity to compensate for loss due to high operating pressures, increased temperatures or normal wear. Thus, in many cases, a smaller pump can be used resulting in a more compact, efficient, and economical installation.

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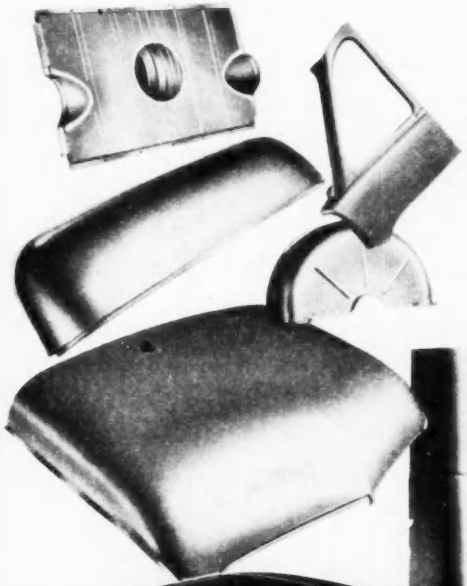
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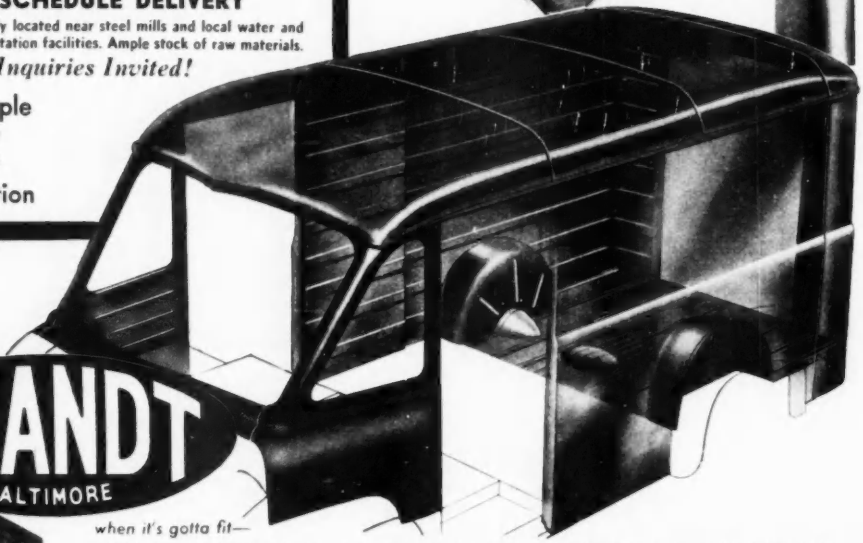
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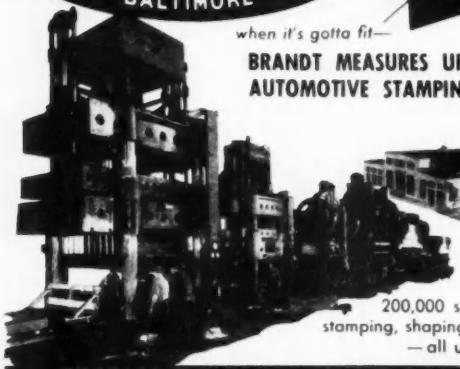


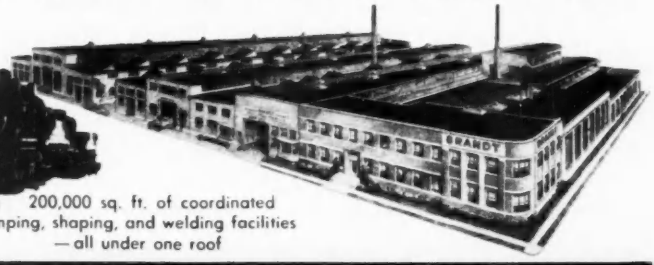


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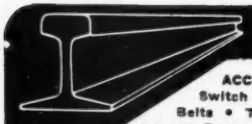
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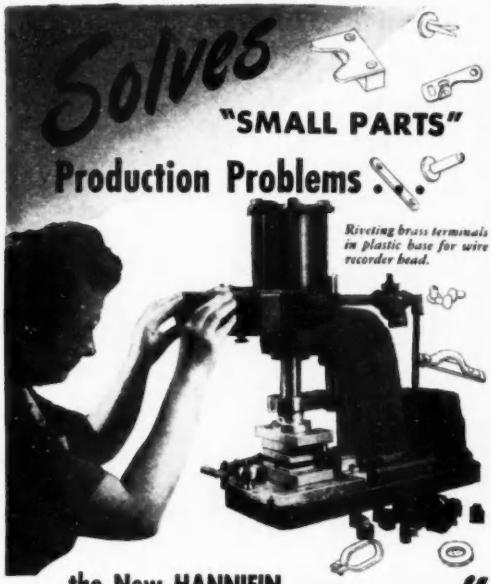
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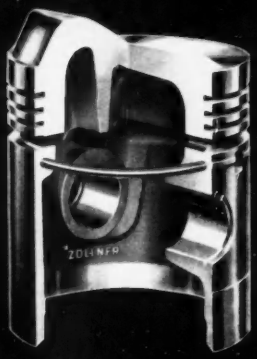
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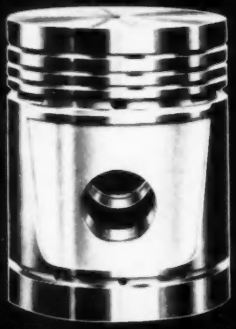
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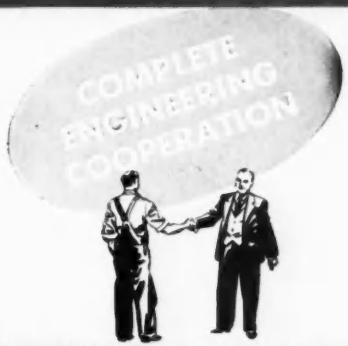
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